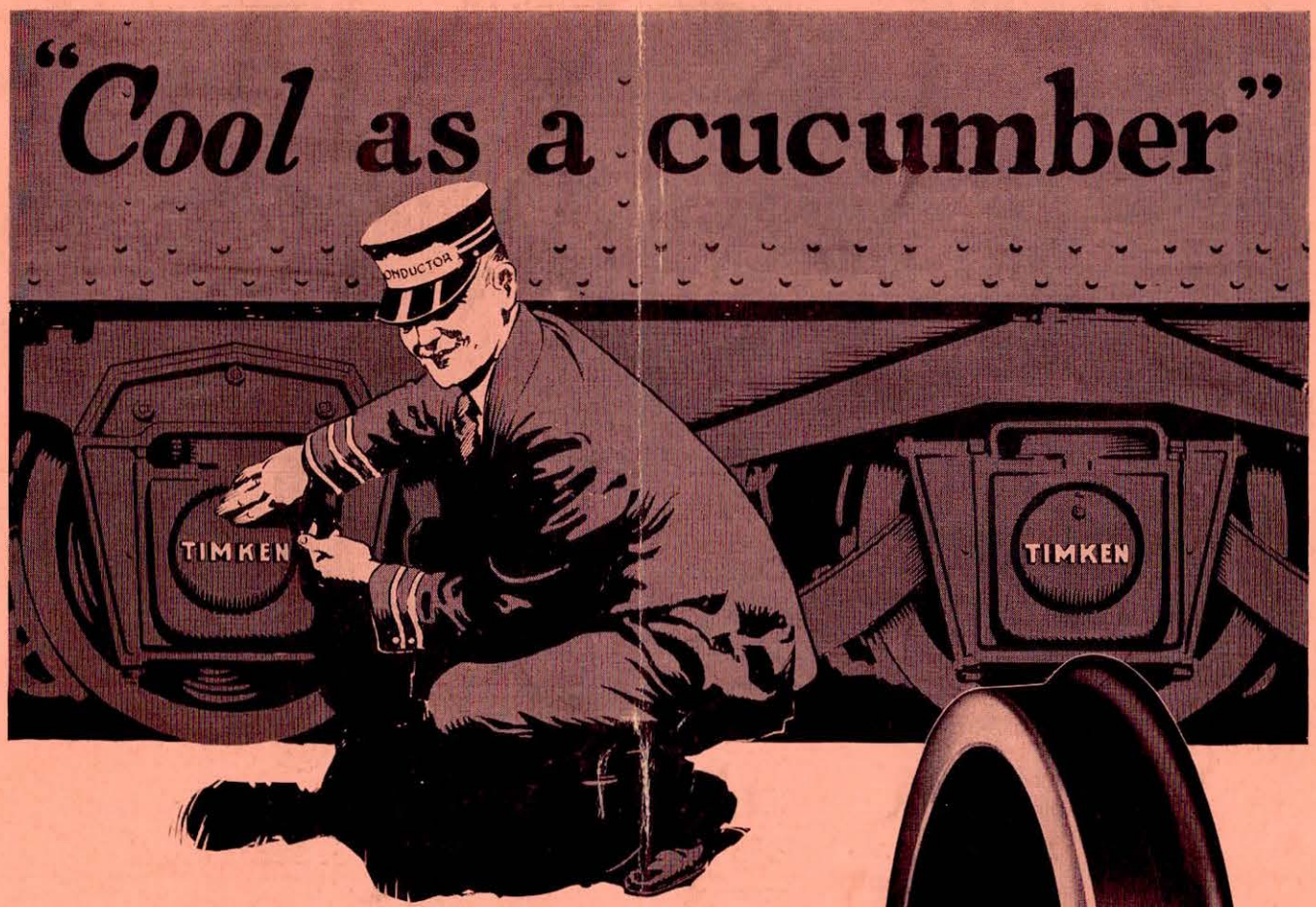
OCTOBER 24, 1931

Railway Age

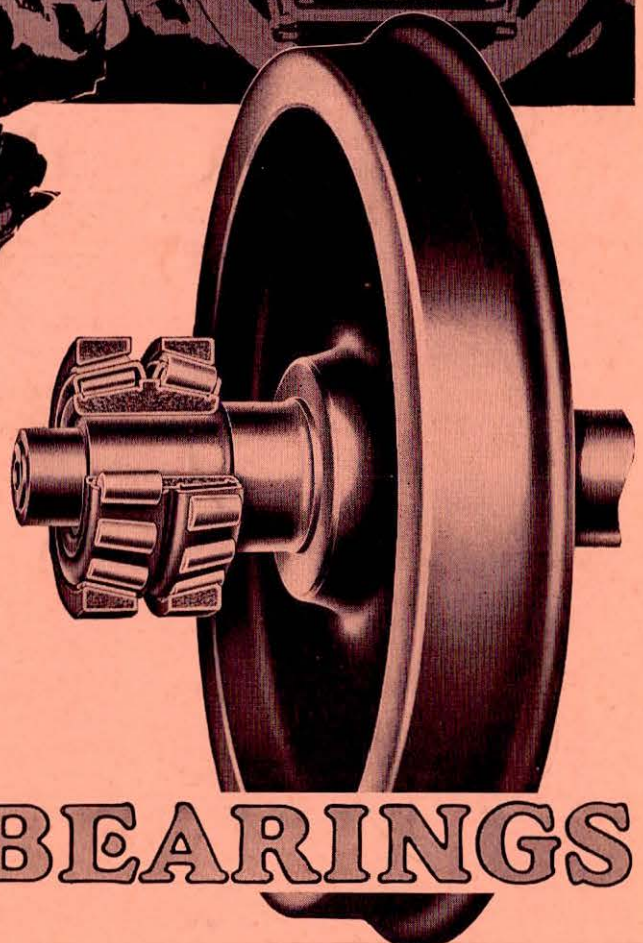
FOUNDED IN 1856

NEW COLLEGE LIBRARY
No.
BRYN MAWR, PA.



The Conductor says:

"Our schedule calls for higher average speed and longer non-stop runs than ever before, but we never have a hot box. That's one of the greatest advantages of Timken Bearings."



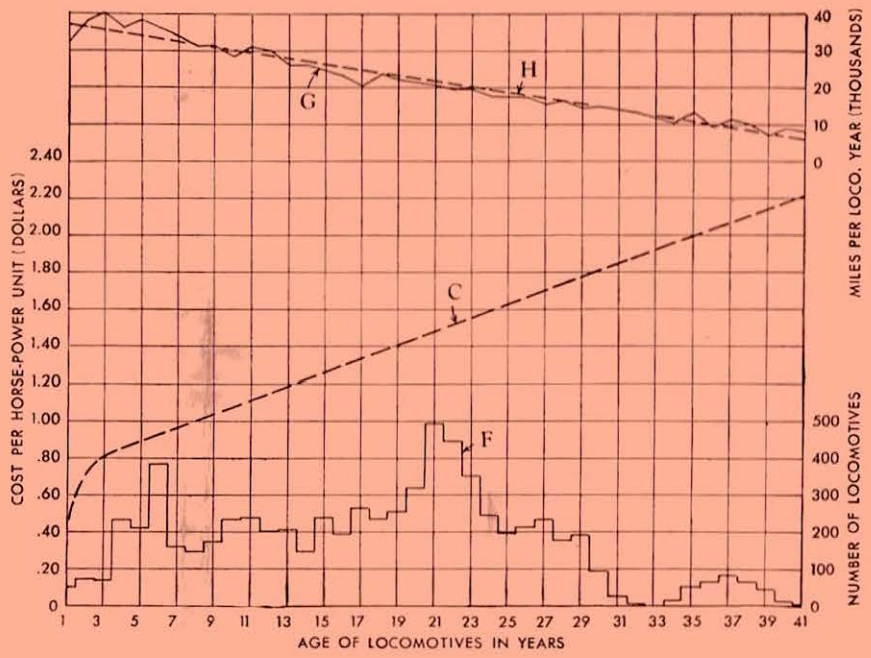
TIMKEN *Tapered Roller* BEARINGS

Alphabetical Index to Advertisers—Page 58

Buyers Directory of Advertisers—Page 51

What is Economy?

"Cheapness of operation, relative or absolute, as expressed in steam, fuel, or money." — *Standard Dictionary.*



CURVE C is the projection of maintenance costs previously explained, and Curve F represents the number of locomotives comprised in it.

Curve G is the actual annual mileage of locomotives of various ages.

Curve H is a straight line projection of Curve G.

Starting with an average mileage of 40,000 in the third year of age, by the twenty-fifth year of age the average mileage has decreased to about 17,500, or an average annual decrease of 1,022 locomotive miles . . . about 2½ per cent.

More maintenance . . . less work . . . per annum, never yet spelled operating economy.

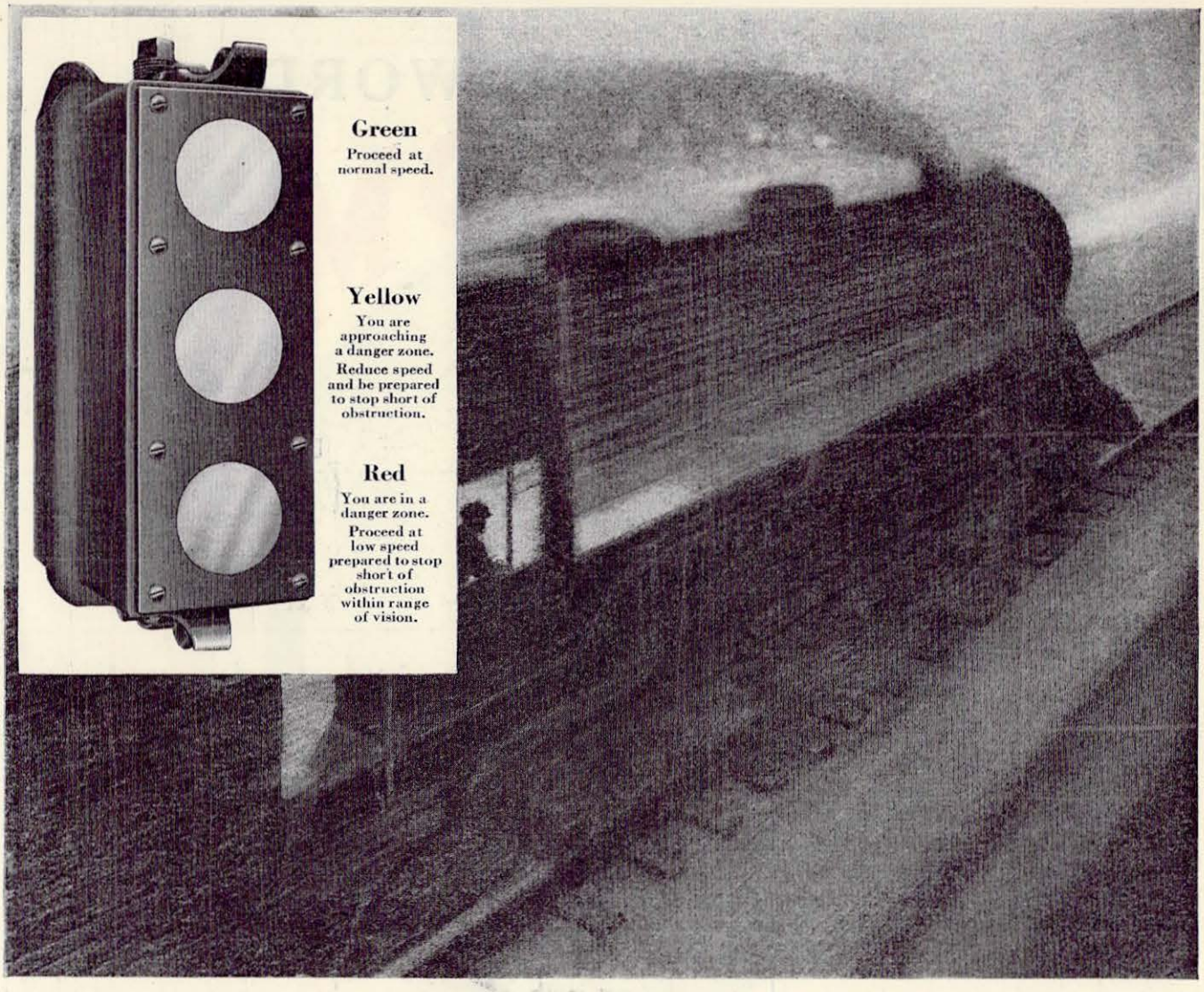
It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

Published weekly by Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa. Entered as second class matter, March 9, 1928, at the Post Office at East Stroudsburg, Pa., under the act of March 3, 1879.
Address communications to 30 Church St., New York City.


Green
Proceed at normal speed.
Yellow
You are approaching a danger zone. Reduce speed and be prepared to stop short of obstruction.
Red
You are in a danger zone. Proceed at low speed prepared to stop short of obstruction within range of vision.

The Eyes of Fast Transportation

Fast transportation whether on land, on water or in the air needs super-human eyes—eyes that see thru fog, rain, sleet and snow.

The locomotive engineer has only human eyes—but when these are aided by the continuous cab signal, schedules may be safely maintained regardless of fog, snow and other handicaps.

Every instant, every foot of the way, the cab signal tells him definitely what the track conditions are ahead. The moment a change occurs an audible signal attracts his attention and a glance at the cab signal tells him what action to take. Thus, he reduces speed when conditions call for reduced speed and resumes speed the moment conditions permit. Time is saved, and track capacity is increased.

You can use the cab signal with or without automatic train control—with or without wayside signals. G-R-S Continuous Cab Signals are giving very successful results without permissive wayside signals.

Consider the provision for the *G-R-S Continuous Cab Signal* in your 1932 Budget. Our Engineers are at your service.

GENERAL RAILWAY SIGNAL COMPANY

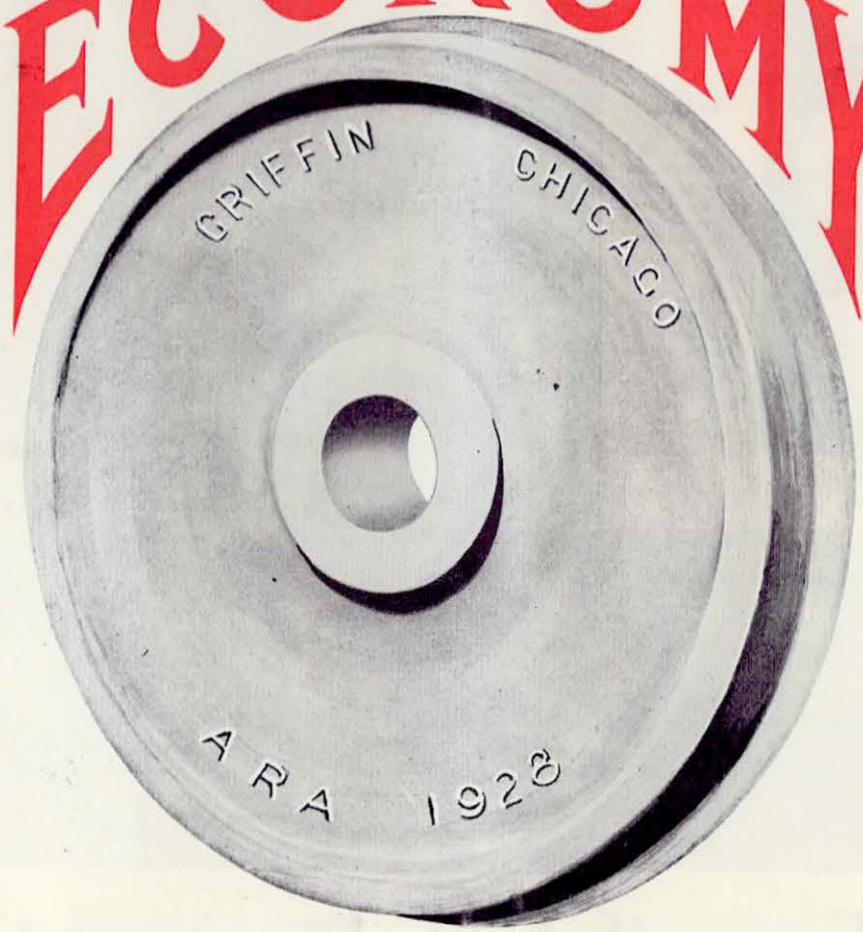
ROCHESTER, N. Y.

A 814

New York Chicago St. Louis Montreal London Paris Barcelona Melbourne

THE WATCH WORD

ECONOMY



TO BE ECONOMICAL A PRODUCT MUST BE

SAFE - DURABLE - PROFITABLE

THE **GRIFFIN SINGLE PLATE WHEEL** IS THE MOST ECONOMICAL FOR ALL CLASSES OF FREIGHT AND EXPRESS SERVICE.

THE FOOD SUPPLY OF THE NATION IS CARRIED ON CHILLED TREAD WHEELS

GRIFFIN WHEEL COMPANY

410 NORTH MICHIGAN AVENUE CHICAGO, ILLINOIS

Plants

Chicago	Boston	Cleveland	Kansas City	Denver	Los Angeles
Pullman	Detroit	Cincinnati	St. Paul	Salt Lake City	Tacoma
			Council Bluffs		

Published every Saturday by the Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa., with executive offices at 30 Church Street, New York

All communications should be addressed to the New York office, 30 Church Street, or to the Chicago office, 105 West Adams Street

SAMUEL O. DUNN, *Chairman of Board*
HENRY LEE, *President*
LUCIUS B. SHERMAN, *Vice-Pres.*
CECIL R. MILLS, *Vice-Pres.*
FREDERICK H. THOMPSON, *Vice-Pres.*
ROY V. WRIGHT, *Sec'y.*
JOHN T. DEMOTT, *Treas.*

CHICAGO
105 West Adams St.

WASHINGTON
17th and H. Streets, N. W.

CLEVELAND
Terminal Tower

SAN FRANCISCO
215 Market St.

Editorial Staff

SAMUEL O. DUNN, *Editor*
ROY V. WRIGHT, *Managing Editor*
ELMER T. HOWSON, *Western Editor*
H. F. LANE, *Washington Editor*

B. B. ADAMS
C. B. PECK
W. S. LACHER
ALFRED G. OEHLER
F. W. KRAEGER
E. L. WOODWARD
J. G. LYNE
J. H. DUNN
D. A. STEEL
R. A. DOSTER
JOHN C. EMERY
MARION B. RICHARDSON
H. C. WILCOX
NEAL D. HOWARD
CHARLES LAYNG
GEORGE E. BOYD
WALTER J. TAFT
GARDNER C. HUDSON
M. H. DICK

The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.)

Subscriptions, including 52 regular weekly issues and special daily editions published from time to time in New York, or in places other than New York, payable in advance and postage free; United States and Mexico, $6.00; Canada, including duty, $8.00. Foreign countries, not including daily editions, $8.00.

Single copies, 25 cents each.

Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 October 24, 1931 No. 17

In This Issue

Oil-Electrics Are Effecting Savings In Switching Service ..... Page 620

Article No. 16 in the Operating Economy Series, describing the economic advantages which have established, for the oil-electric locomotive, a definite place in the railroad yard.

Modern Rail-to-Keel Terminal Built at New York Harbor 629

A description of a new development, including two piers and over 1½ million square feet of warehouse and cold storage space, recently added to the Pennsylvania's New York waterfront facilities.

Rate Rise Application Denied 634

H. F. Lane, Washington editor, *Railway Age*, reports and analyzes the recent decision of the Interstate Commerce Commission, denying the railroads' request for an increase in rates but setting forth an alternative plan, together with much paternal advice.

EDITORIALS

Federal Trade Commission on "Reciprocal Buying" 617
Railway Rates, Wages and Unemployment 619

GENERAL ARTICLES

Oil-Electrics Are Effecting Savings In Switching Service 620
Reduced Barge Rates On Cotton Suspended 623
Hearings on Railroad Practices 624
Modern Rail-to-Keel Terminal Built at New York Harbor 629
Freight Car Loading 633
Rate Rise Application Denied, by H. F. Lane 634

MOTOR TRANSPORT SECTION

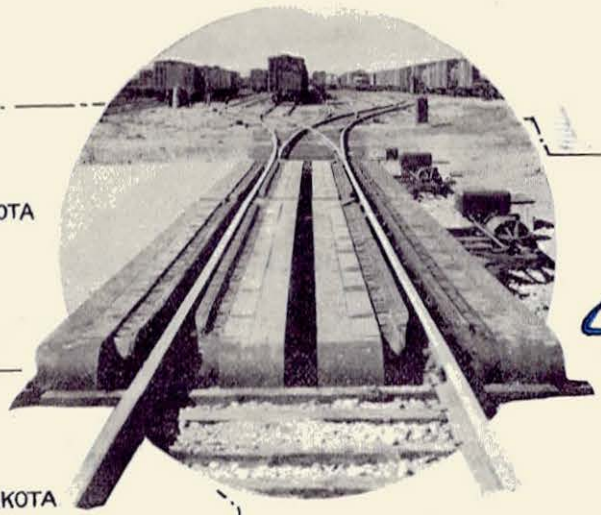
Co-ordinated Rail and Truck Service, by Russell W. Talbot 640
A. C. F. Builds Special Service Truck 642
Reducing Maintenance Costs 643
Twin Coach Offers 17-Passenger Model 647

ODDS AND ENDS 648

NEWS 649

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

A NECESSITY---not an



NORTH DAKOTA

SOUTH DAKOTA

NEBRASKA

IOWA

WISCONSIN

MICH

ILLINOIS

INDI

OHI

Omaha

Kansas City

St. Louis

Chicago

Fort W

ERIE

C. B. & Q. R. R.

MISSISSIPPI RIVER

GIBSON RETARDERS 76

GALESBURG RETARDERS 20

MARKHAM RETARDERS 121

GIBSON RETARDERS 29

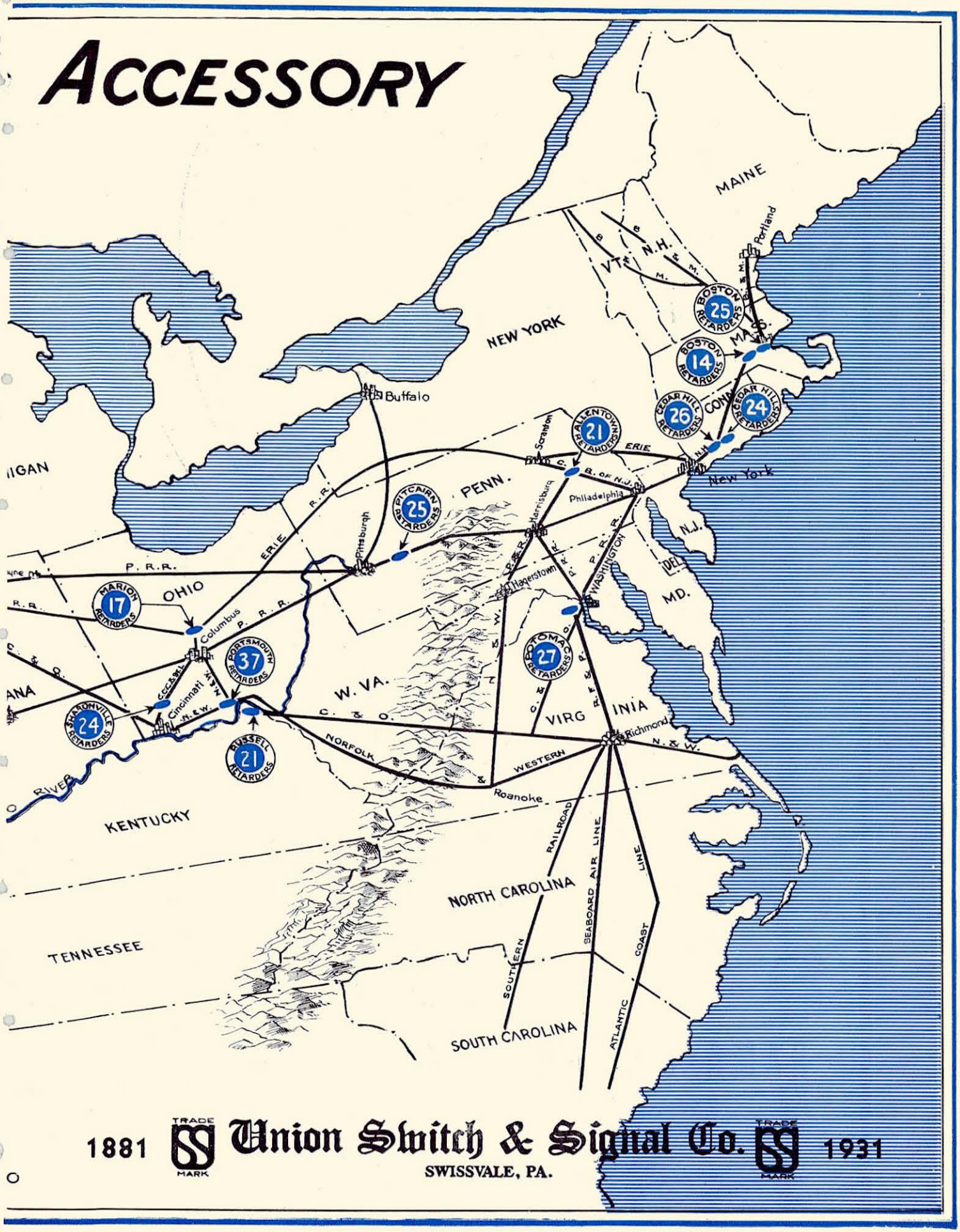
¶ Evidence of savings effected through use of "Union" Electro-Pneumatic Car Retarders accumulates. Not a single retarder installation has failed to more than pay its way. Naturally, these savings vary in different localities and under differing conditions, but in every instance large savings are recorded in many operating accounts. They are paying for themselves in from one to four years.

¶ "Union" Electro-Pneumatic Car Retarders maintain a smooth and continuous movement of cars through a terminal or yard; shipments are speeded; accidents and damage to equipment are reduced; labor costs are minimized; yard operation is facilitated. » » » » » » » » » »

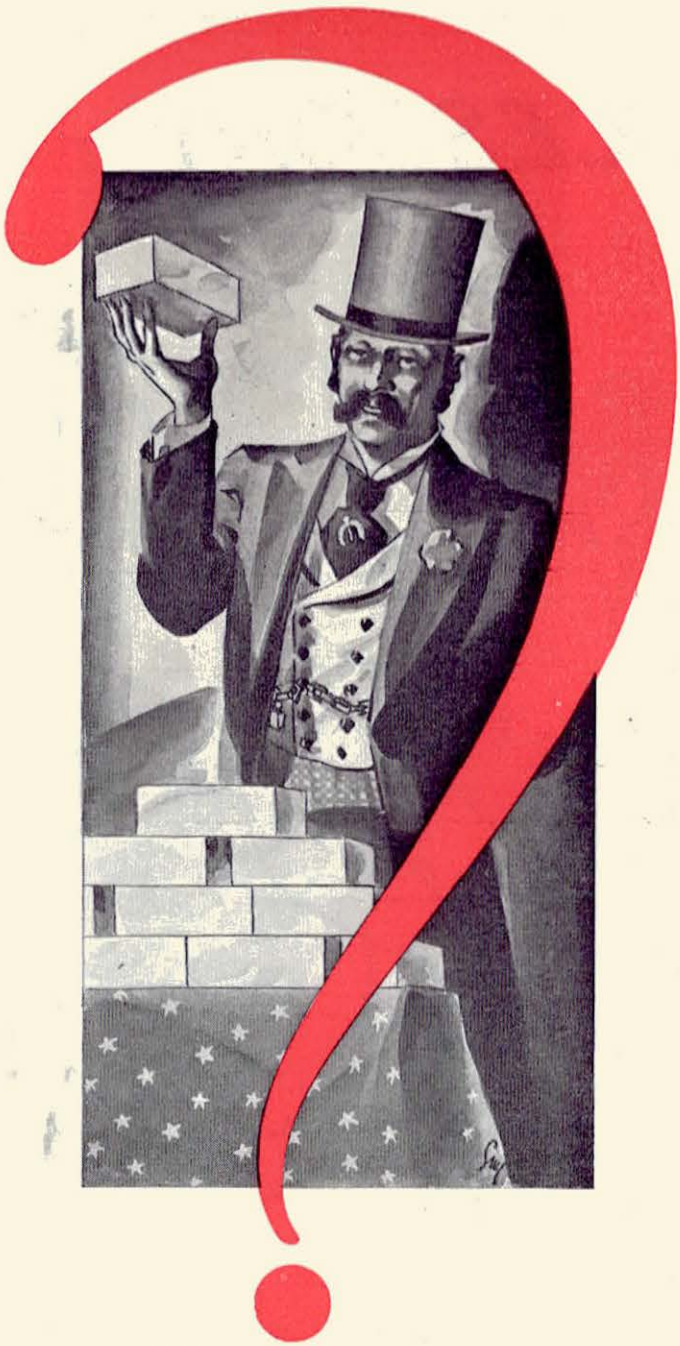
¶ When these facts are considered, small wonder that the classification yards on this map, showing actual installations of Electro-Pneumatic Car Retarders, are becoming more numerous. There are 514 of these retarders in service, 507 of which are in classification yards. Communicate with our nearest district office for additional facts. » » » » » » » » » »

DISTRICT OFFICES

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISC


ACCESSORY
MAINE
Portland
VT.
N.H.
BOSTON RETARDERS 25
BOSTON RETARDERS 14
MASS.
NEW YORK
Buffalo
CONN.
CEDAR HILL RETARDERS 26
CEDAR HILL RETARDERS 24
ALLENTOWN RETARDERS 21
Scranton
ERIE
New York
PITCAIRN RETARDERS 25
PENN.
Pittsburgh
Harrisburg
Philadelphia
N.J.
P.R.R.
WASHINGTON
MD.
DEL.
MARION RETARDERS 17
OHIO
Columbus
Cincinnati
PORTSMOUTH RETARDERS 37
SHARONVILLE RETARDERS 24
RUSSELL RETARDERS 21
POTOMAC RETARDERS 27
W. VA.
VIRGINIA
Richmond
N. & W.
NORFOLK & WESTERN
Roanoke
KENTUCKY
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
SOUTHERN RAILROAD
SEABOARD AIR LINE
ATLANTIC COAST LINE
1881 TRADE MARK Union Switch & Signal Co. TRADE MARK 1931
SWISSVALE, PA.

WILL YOU BUY $12. for one dollar?



We can make such a deal for you . . . not gold bricks . . . but an investment which returns one dollar a month for each dollar invested. And twelve months a year is $12.00. It is simple . . . install the Ramapo 3-in-1 Automatic Safety Switch Stand (model 100-A) at the ends of double track and passing sidings . . . It eliminates the necessity for stopping and starting trains for switch operations. The savings in time, energy and labor at an average location pays for its original cost and installation in less than the first month of its operation. Then you are "on velvet."

There are three mechanisms all combined in one compact housing: The Switch Stand Spindle is connected rigidly with the switch points, assuring positive target indication for position of switch points and rigid throw for hand operation; two automatic double-coil springs which return the switch points after the trailing train has passed; a retarding oil-buffer which prevents the return of the points between successive pairs of wheels. Tests have proved conclusively that this combination has answered all the problems of traffic through turnouts at the ends of double track and passing sidings.

More than ever is it necessary for railroads to discover further means for reducing operating and maintenance overhead . . . This is your opportunity to assist . . . your duty to get facts on the 3-in-1 Switch Stand by return mail. No obligation. Write J. B. Strong, President, Ramapo Ajax Corporation, 230 Park Avenue, New York City, N. Y.

RAMAPO AJAX CORPORATION

Racor Pacific Frog and Switch Company . . . . . Los Angeles—Seattle
Canadian Ramapo Iron Works, Limited . . . . . Niagara Falls, Ontario

General Offices—230 Park Avenue, New York

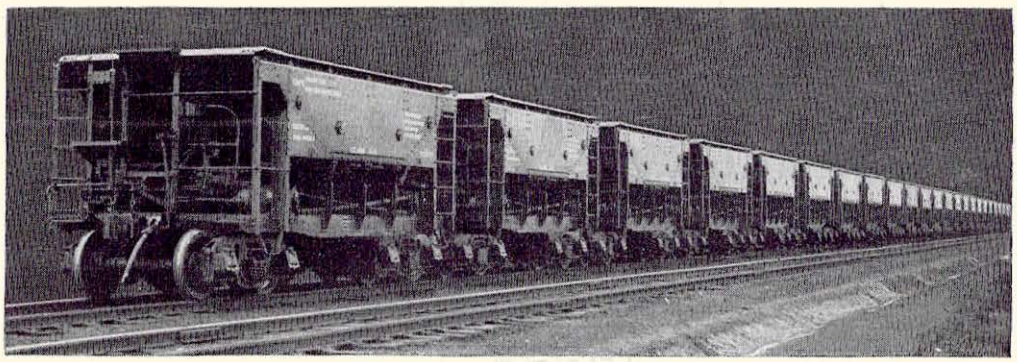
Sales Offices at Works and McCormick Bldg., Chicago Midland Bank Bldg., Cleveland, Ohio Builders Exchange Bldg., St. Paul Metropolitan Bank Building, Washington Union National Bank Building, Houston, Texas

Nine Racor Works: Hillburn, N. Y. Niagara Falls, N. Y. Chicago, Ill. East St. Louis, Ill. Superior, Wis. Pueblo, Col. Los Angeles, Cal. Seattle, Wash. Niagara Falls, Ont.

RACOR

SPECIALISTS IN TRACK-WORK MATERIALS

Railroads handling iron ore are realizing the advantages of Commonwealth one-piece cast steel underframes

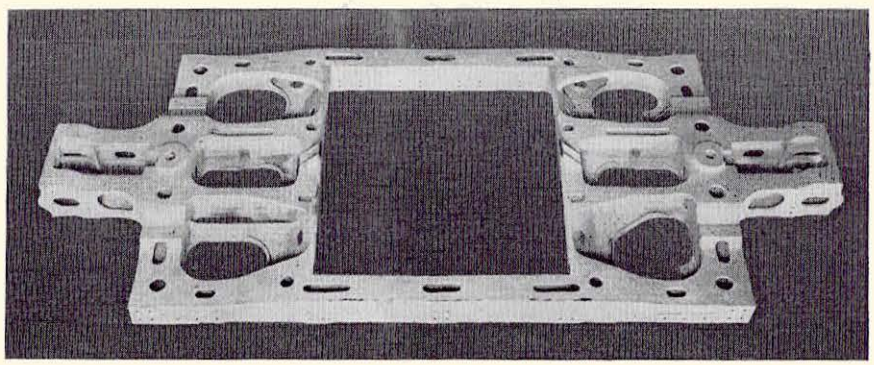


A Train of Ore Cars with One-Piece Underframes

Results: MUCH STRONGER CARS

MAXIMUM LOADS

MINIMUM WEIGHT



Bottom View of Underframe

Much Greater Strength In Side Sill Members, Bolsters and Draft Sills

Repair Costs of Entire Car Greatly Reduced

GENERAL STEEL CASTINGS CORPORATION

COMMONWEALTH PRODUCTS

EDDYSTONE, PA. GRANITE CITY, ILL.

Teletype is like a messenger wearing seven league boots

It annihilates both distance and time by sending typewritten messages by wire!

Whether it is used for inter-city traffic or merely within terminals, Teletype will accomplish savings that will astonish you. In railroad service it has effected economies ranging from $9,000 to $110,000 annually!

Railroads find Teletype unequalled for general message work, for handling train announcements in terminals, for dispatching information from yard offices to switch towers, for reporting car arrivals to trace bureaus, and for sending consists, wheel reports and car diversion orders.

Operated just like a typewriter, Teletype sends typewritten messages over either telephone or telegraph wires. It can be duplexed or multiplexed to transmit two to eight messages over the same wire at the same time!

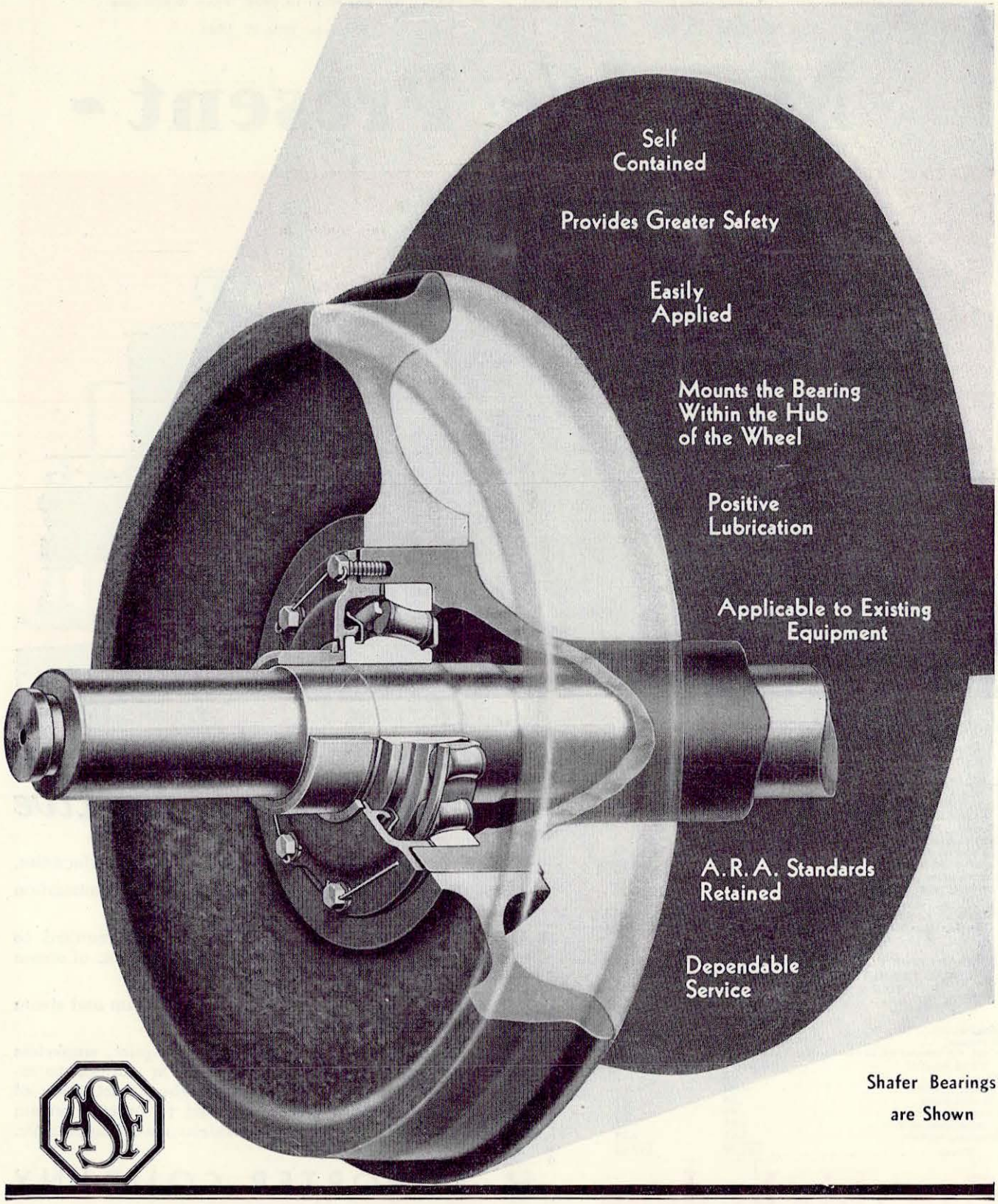
More than 65,000 Teletypes are now employed by railroads and other organizations requiring a speedy, accurate and economical means of communication. Among the users of this electric messenger are such leading roads as the New York Central, Pennsylvania, Southern Pacific, Illinois Central, Union Pacific, Santa Fe, Rock Island and Burlington. For further information write the Teletype Corporation, 1400 Wrightwood Ave., Chicago.

TELETYPE

SUBSIDIARY OF

Western Electric Company

American Steel Foundries Roller Bearing Unit



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

NET EARNINGS MUST BE INCREASED

The margin between income and outgo must, however, be increased, either by an increase in total earnings or by further reductions of expenses. Such retrenchments as already have been made by curtailing

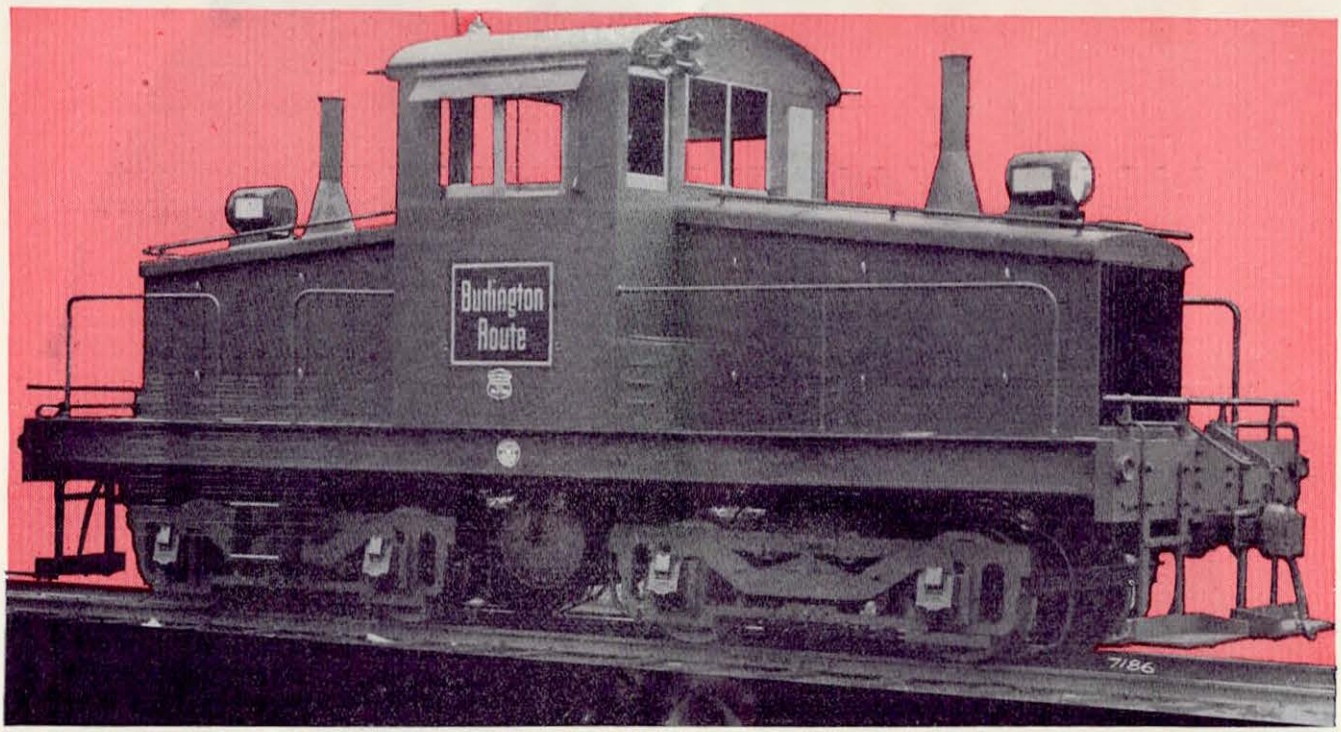
Ry. Age, Sept. 12, 1931

DECLINE OF EARNINGS AND OPERATING EXPENSES

The total earnings of the Class I roads in 1929 were $6,360,000,000. In the first one-third of 1931 they were 27½ per cent less than in the first one-third of 1929. On this basis total earnings in 1931 would be $1,750,000,000 less than in 1929. They would also...

Ry. Age, June 27, 1931

May We Present -



COMPARATIVE DAILY COST OF SWITCHING C. B. & Q. INDUSTRY TRACKS AT CRETE, NEB.*

	Steam Switcher, Class G-3		Gas-Electric 7168
Engineman	$ 7.16		$7.16
Fireman	5.63		...
Coal, 5.6 tons at $4.26 (Including $11.82 freight)	23.86	Gasoline	4.42
Wood	.44		...
Water, 2 tanks	2.00		...
Oil and waste	.33		.40
Other supplies	.53		.53
Enginehouse service	7.34		4.07
Running repairs	8.08		4.48
Total	$55.37		$21.06

*Steam locomotive costs based on averages over extended period. Gas-electric costs based on averages over a period of one month.

COMPARATIVE COST OF NINE-HOUR ROUND TRIP IN LOCAL FREIGHT SERVICE BETWEEN KEOKUK, IOWA, AND MT. PLEASANT

	Steam Locomotive Class K-2		Gas-Electric 7168
Engineman	$ 9.48		$9.48
Fireman	7.11		...
Coal, 4.5 tons at $4.26 (Including $9.50 freight)	19.17	Gasoline	8.84
Wood	.22		...
Water, 2 tanks	2.00		...
Oil and waste	.28		.28
Other supplies	.44		.44
Enginehouse service	6.44		3.57
Running repairs	9.63		5.34
Total	$54.77		$27.95

Can this be done on *your* railroad?

-and some places where it might prove effective

1. Outlying points now requiring full steam crew and facilities.

2. Branch line local freight or mixed service in combination with Terminal switching in 16 or 24 hour service.

3. Elimination of overtime on local freights required to handle switching at points not justifying expense of steam switches.

4. Small terminals where gas-electric cars tie up and steam facilities are maintained only for switchers.

5. Use in city or wholesale districts for quiet, smokeless operation, agility on grades and curves, in addition to inherent economies. Possibly eliminate the perpetuation of expensive small steam power required to protect certain industries where curvatures make modern power inapplicable.

H. K. PORTER COMPANY
PITTSBURGH, PA.

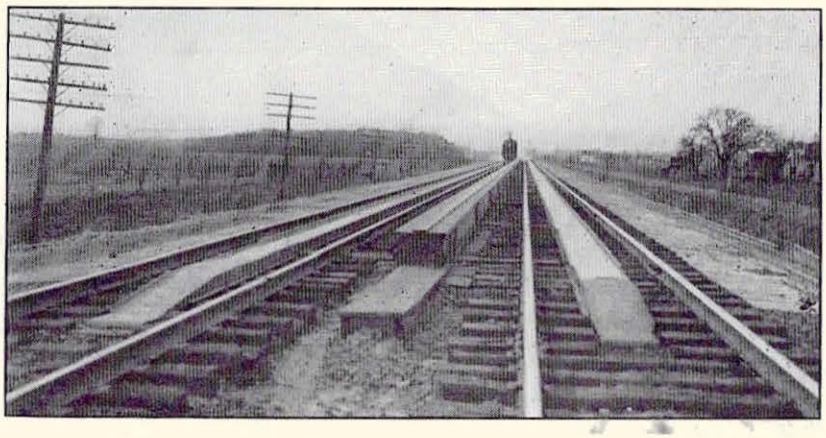
New York Office
44 Whitehall Street

Chicago Office
Wells St. & Wacker Drive

Builders of Steam, Fireless Steam, Gasoline-Electric, Oil-Electric, Gasoline and Compressed Air Locomotives

For Effective, Durable Subdrainage, at Low Maintenance Cost—choose

ARMCO *Perforated* PIPE



Heaving of the track was eliminated and an extra gang moved elsewhere when this track pan installation at Huron, Ohio, was adequately subdrained with Armco Perforated Pipe.

THE use of this pure iron product, an Armco development, is a distinct economy. It adequately fills the need for efficient drainage of right-of-way, retaining walls, abutments, yards, terminals, multiple tracks and grade crossings.

Whenever water is to be carried off as fast as it falls, Armco Perforated Pipe can be depended upon to do it.

Railroads, countrywide, have found this long-lasting pure iron pipe to be the most efficient, the most dependable they can install—a pipe with an unequaled 25-year record for durability and trouble-free service in the railroad drainage field.

Armco Perforated Pipe is used to prevent landslides and the undermining of subgrades, to tap water pockets, to eliminate soft spots and heaving, to quickly remove surplus water around track pans, and to drain wet cuts.

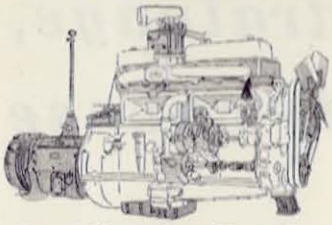
For dependable subdrainage, choose Armco Perforated Pipe.

Factual data on this unusual product, in use under all conditions, will be sent on request. Write today for catalog R-4.

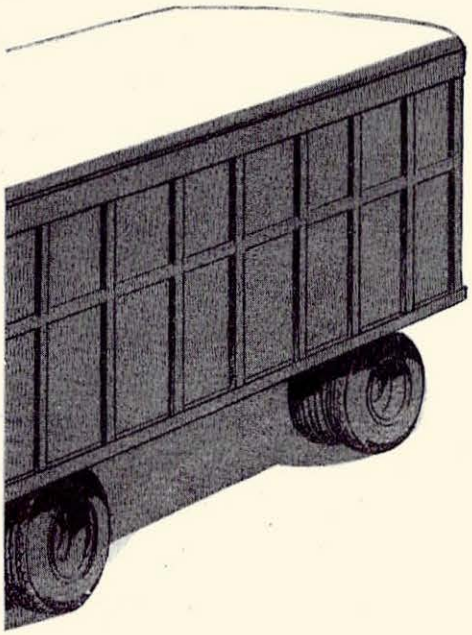
Armco culverts and drains are manufactured from Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION
Middletown, Ohio

TORQUE UP TO 450 POUNDS—Speed up your runs! Cut down the delays on grades and heavy loads! Load to capacity every time! You can do it with General Motors Super Heavy-Duty Trucks and Tractors. These new *road giants* are driven by 115 or 150 horsepower engines—General Motors truck-built sixes that develop as much as 450 foot-pounds torque. They have ample energy to handle the heaviest hauling jobs quickly. And you can use every ounce of their power, with safety. All General Motors Trucks are designed as a unit, with ample strength in every part to meet the most severe requirements.



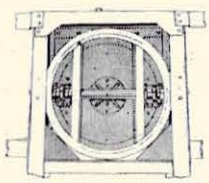
General Motors Super Heavy-Duty engines have proved their dependability in millions of miles of service.



PAYLOADS UP TO 20 TONS PER TRAILER—General Motors truck-built trailers introduce important new economies to trailer operation. They are designed by truck engineers, and built to truck standards of ruggedness by an exclusive commercial-vehicle organization. Many of their parts are interchangeable with General Motors Truck parts—that simplifies maintenance problems. They are serviced by General Motors Truck Company branches and dealer establishments—the same organizations that service your trucks. And they are sold by truck dealers who are trained to give you valuable co-operation in selecting hauling equipment that exactly fits your requirements.

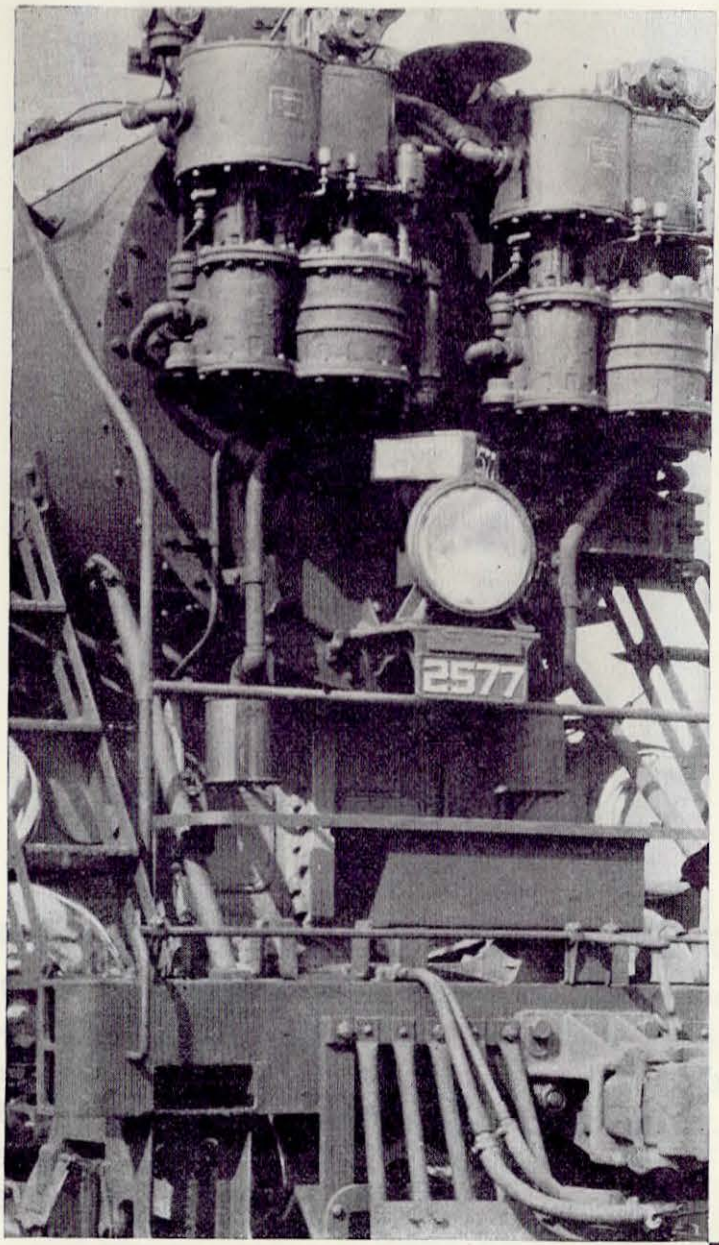
Time payments financed at lowest available rates through our own Y. M. A. C.

General Motors Truck Company, Pontiac, Mich. (A Subsidiary of Yellow Truck and Coach Mfg. Co.)



The General Motors universal fifth-wheel is adaptable for use with the majority of tractors in service today.

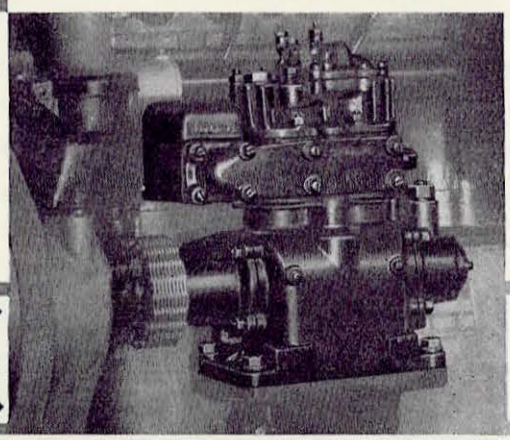
GENERAL MOTORS
SUPER HEAVY-DUTY TRUCKS
AND
TRUCK-BUILT TRAILERS



★ On rail or road, air brake equipment plays a prominent part in the picture of modern motive power it safeguards . . . a visible assurance of a perfect power-to-stop.

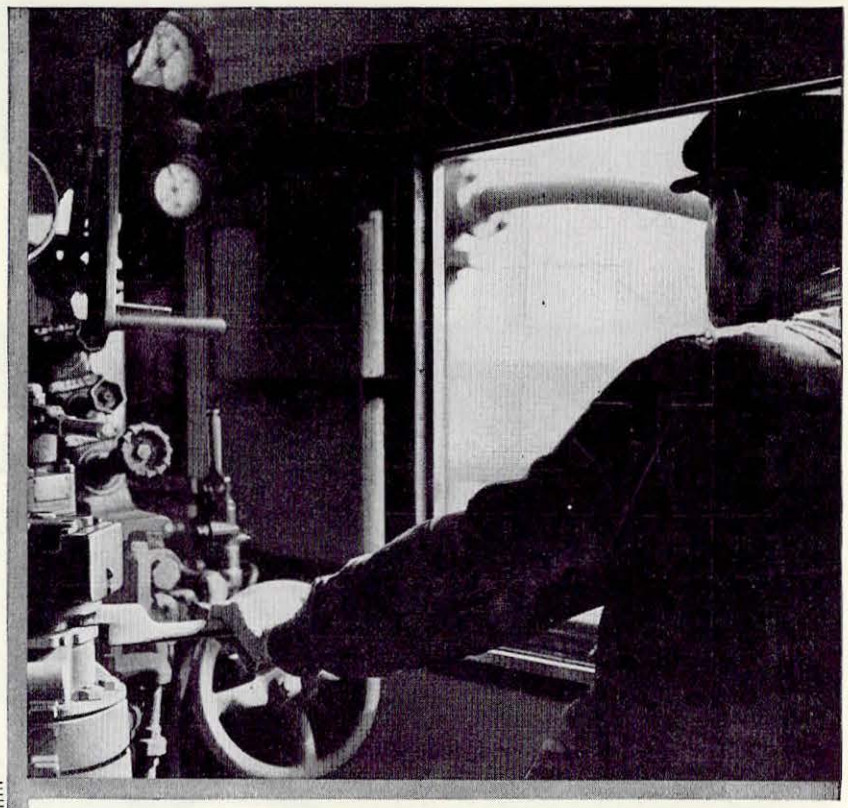
62 years ★ ★ ★ ON RAIL and ROAD

Out of an illustrious past into a future of even greater achievement, Bendix-Westinghouse Automotive Air Brakes continue unchallenged as the time-tested, world-standard of positive braking safety ★ Superseding various other types of power brakes, more than a half century ago, the original air brake assumed its place as standard equipment in virtually all forms of rail transportation . . . Consistently perfect performance won for "air," as a braking force, the rightfully respected place it maintains today ★ Little wonder, with such a background plus recent achievement, that today's Bendix-Westinghouse Automotive Air Brakes are recognized as standard by a great majority of the world's foremost builders and operators of heavy-duty highway transport vehicles ★ For an answer to any question you may have concerning modern brake control, address BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY at Pittsburgh, Pennsylvania.

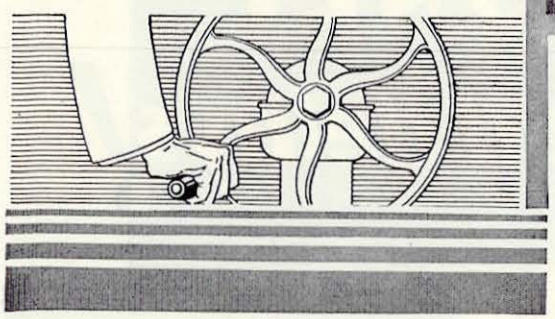


6297

BENDIX ★
WESTINGHOUSE
AUTOMOTIVE ★ AIR ★ BRAKES



THE AIRBRAKE gave control to railroads



Ethyl gave control to gasoline

WHEN a train came to a stop in the sixties, passengers grabbed their hats and their false teeth as brakemen scurried from car to car setting each brake. Then George Westinghouse put compressed air to work and made possible the safety and comfort of the modern passenger train.

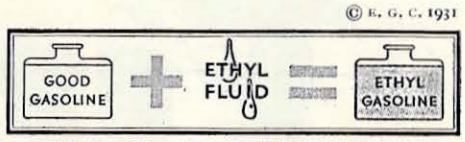
\+ \+ \+

Automobile engineers have long wanted higher compression engines because they are more efficient. But higher compression meant greater pressure on the motor fuel, and ordinary gasoline could not stand the strain. Under high pressure it wasted its power in uneven explosions. That is why a search was started for an ingredient to *control* the combustion of gasoline—and why leading oil refiners now add Ethyl fluid to their good gasoline.

Ethyl fluid gives gasoline the ability to resist pressure. It opens the door to higher compression engines and to the greater acceleration, cooler combustion, and increased power that they give.

Higher compression engines give you a chance to speed up schedules, to save money on fuel and maintenance. They are the solution to the problem of good service at full loads. Ethyl Gasoline is the only fuel that answers their need satisfactorily, and gives the economy of *maximum* performance. Ethyl brings out the best in *any* engine. Ethyl Gasoline Corporation, Chrysler Building, New York City.

© E. G. C. 1931



The active ingredient used in Ethyl fluid is lead

ETHYL GASOLINE

FOUR MILLION MILES—

ONLY 5 road delays!

11,400 miles a day. Four million miles a year! Every one of these miles in the South, where summer heat puts an extra strain on tires. Yet under these gruelling conditions, the Camel City Coach Company, operating a fleet of seventy-five buses—HAD ONLY FIVE ROAD DELAYS FOR THE FOUR MILLION MILES! But let Mr. J. L. Gilmer, President of the Atlantic Greyhound Lines, Camel Coach Division, tell you about it:—"Even under the most severe conditions of road and weather," says Mr. Gilmer, "we have found Firestone Balloons, plus Firestone service, an unbeaten combination. As you can imagine, our adoption of Firestone has proven a very considerable operating economy in addition to increasing the traveling comfort of our passengers and the punctuality of our schedules."—Firestone Balloons for your trucks or buses SAVE you money; REDUCE your road delays. Your Firestone dealer nearby will be glad to tell you the whole story. When purchasing new equipment, be sure to ask for

Firestone Balloons, Tubes, Rims, Batteries,
Brake Lining and Accessories

Firestone

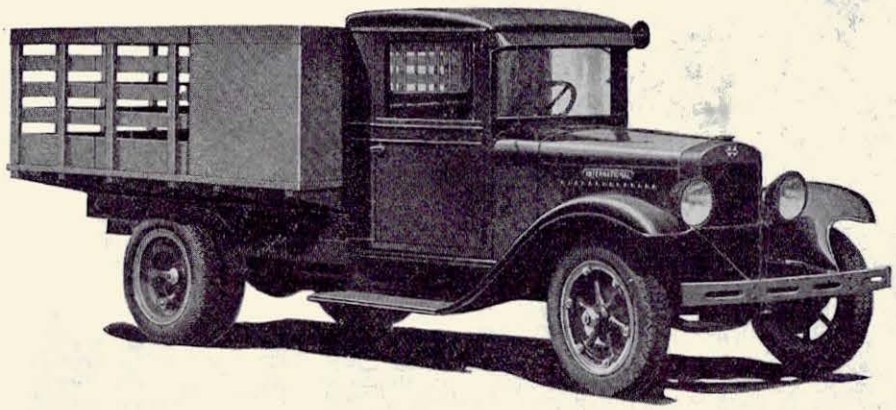
BUS BALLOONS

◀◀ LISTEN TO THE VOICE OF FIRESTONE EVERY MONDAY NIGHT OVER N. B. C. NATIONWIDE NETWORK ▶▶

Copyright, 1931, The Firestone Tire & Rubber Co.

International Quality Trucks

—in the low price range!



New Model A-2, a 1½-ton 4-speed International. The price of the 136-inch wheelbase chassis with standard equipment is

$675

f. o. b. factory

IN the building of high-grade motor trucks, International Harvester has advanced by what may well be called "leaps and bounds." Today this Company ranks high among the leaders in truck manufacture, making both speed and heavy-duty models for all hauling requirements. Three-fourths of the huge annual output of International Trucks is sold to industry and commerce, one-fourth to agriculture.

International Truck success is based on true quality, demonstrated economy and lasting satisfaction—and on SERVICE.

The largest Company-owned truck service organization in the world stands back of International Truck operation. Branches at 183 points in the United States and Canada, supplemented by thousands of dealers, provide a service that is of extreme value to the International owner. Whether he is in Syracuse or San Diego, in Seattle or Savannah, the same complete stocks, the same modern equipment for repairs and overhauling, the same expert attention at lowest costs are at his service at a neighboring International branch.

TODAY'S official new-truck registration figures indicate that International is increasing its leadership in truck manufacture and sales during 1931—growing tribute to these trucks and this service.

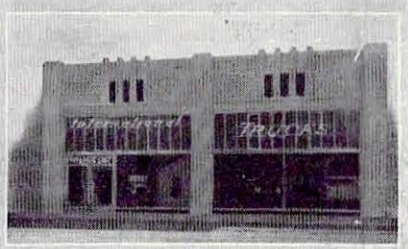
The full line of modern International trucks, of handsome design, and with absolutely no sacrifice in quality, is now available with a low schedule of prices made possible by quantity production.

Ask for a demonstration of the 1½-ton Model A-2 featured above, or any other International. Sizes range from ¾-ton to 5-ton.

BALTIMORE *or* BAKERSFIELD

International branches are established *to stay*. We may relocate to better the service, but we have never abandoned a territory. A view of the interior of one factory-standard service branch, in small town or large, is a view into them all—183 *Company-owned International branches*. And in-between are *hundreds of International Truck dealers*, with service ideals patterned after our own. The object of them all is to keep Internationals on the job at low cost—to keep International owners content with their trucks.

The International Branch at Baltimore, Md.



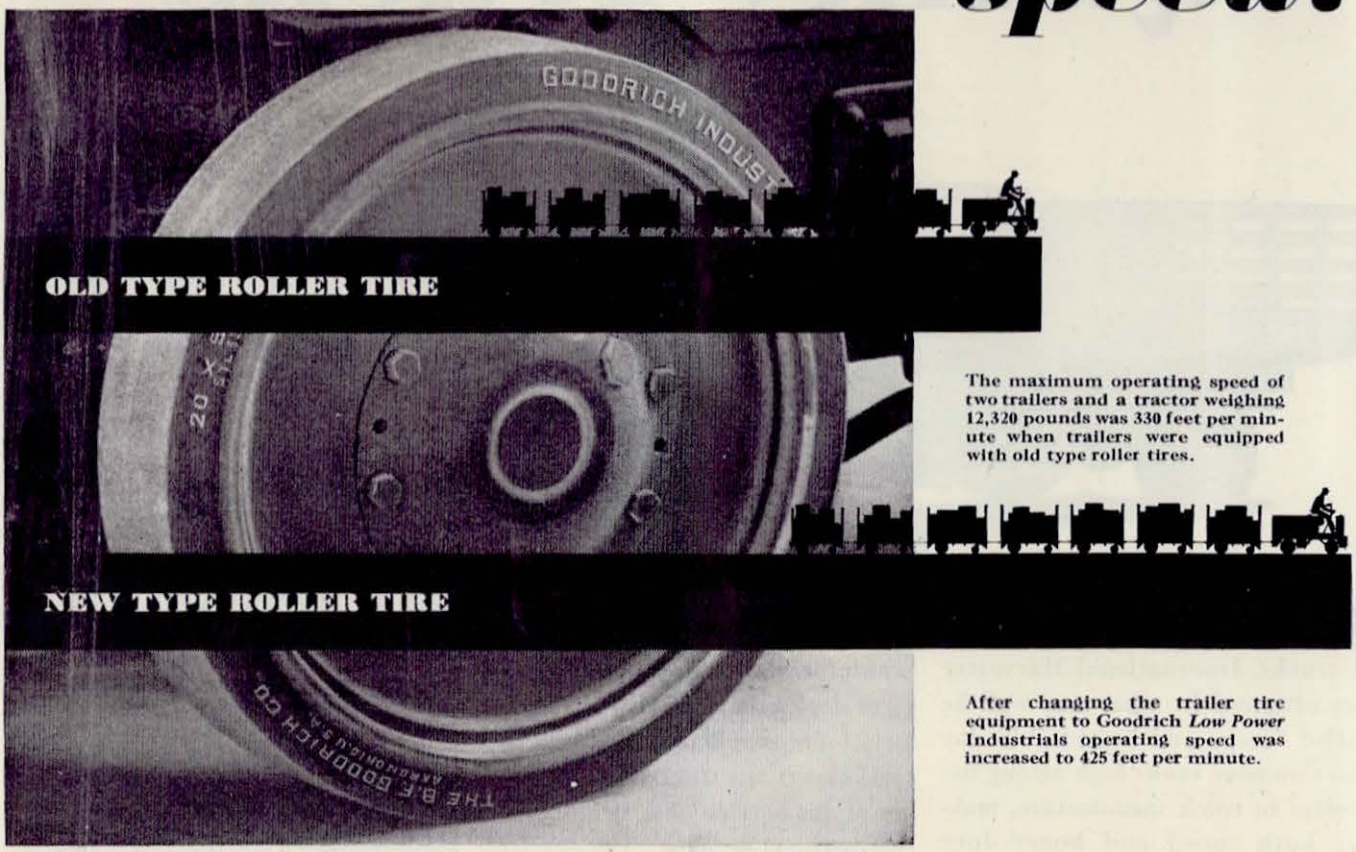
The International Dealer (A. H. Karpe) at Bakersfield, Calif.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA (INCORPORATED)
606 S. Michigan Ave. Chicago, Illinois

INTERNATIONAL

INTERNATIONAL TRUCKS

28.9% greater rolling speed!



The maximum operating speed of two trailers and a tractor weighing 12,320 pounds was 330 feet per minute when trailers were equipped with old type roller tires.

After changing the trailer tire equipment to Goodrich *Low Power* Industrials operating speed was increased to 425 feet per minute.

New Goodrich Industrials cut Power Consumption..Give Increased Cushion

"THE greatest industrial tire development in years"... "Sets a new high standard of trailer tire performance"... "A most important contribution to the efficiency of inter-plant hauling"—That's the way transfer agents, plant superintendents and foremen everywhere hail this remarkable new Goodrich product—the Goodrich *Low Power* Industrial Tire.

The facts behind these great new tires fully justify the enthusiastic acclaim they're receiving. Recent tests showed that, compared with the old type roller tires heretofore accepted as standard, Goodrich *Low Power* Industrials *improved the starting and rolling speed of an average trailer and tractor unit 28.9%!*

In terms of power consumption alone this means a saving of 45.8%. And that's only part of the story. Goodrich *Low Power* Industrials were found to *give increased cushion. They showed 157% greater resiliency than the old type tire, and much more resistance to wear.*

Compared with steel wheeled trailers, the contrast was even greater. *These new type tires not only rolled easier—they actually improved the starting or drawbar pull 172% under identical operating conditions.*

• • •

Truly the advent of Goodrich *Low Power* Industrials has made former standards of industrial tire performance obsolete. Now, more than ever, you should insist on Goodrich Tires for your tractors and trailers. The B. F. Goodrich Rubber Co., Est. 1870, Akron, Ohio, and Los Angeles, California.

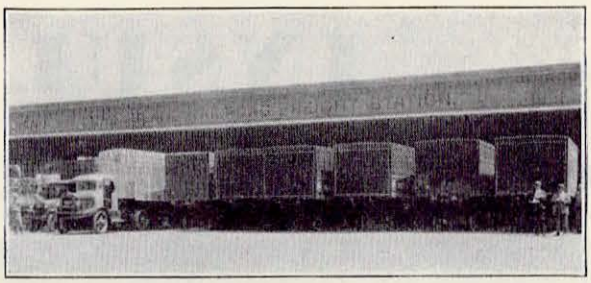
Goodrich

INDUSTRIAL TIRES

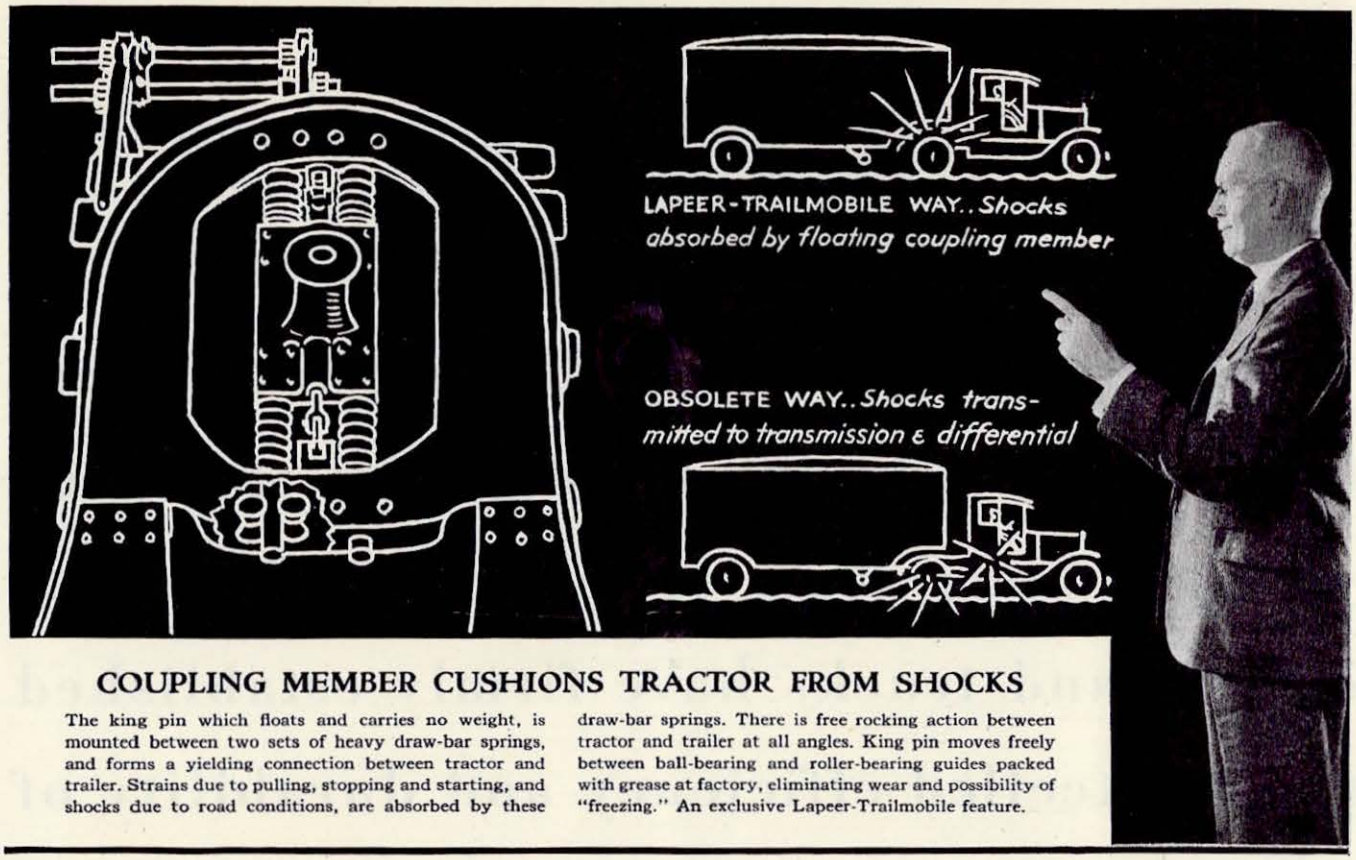
SPECIFY GOODRICH

SPEED · SAFETY · PROFITS

IT requires no profound logic to see that the greater the speed, safety and economy, the more certain is the profit from your trucking operations. Lapeer-Trailmobile system of auxiliary transportation provides these essentials in maximum degree, made possible by an exclusive combination of advanced improvements. Coupling member that floats and cushions the motor unit from shocks (see below), 100 per cent cab control which protects the driver from all the risks and delays of manual operation, automatic overriding brakes which equalize the speed of tractor and trailer when the trailer tends to override the tractor, self-leveling support legs which increase safety while loading and insure operation in the minimum length of time—these are but a few of the outstanding features. A demonstration will make them all clear to you. Write The Trailer Company of America, Cincinnati, Ohio.



Motor Haulage Co., Inc., Brooklyn, uses Lapeer-Trailmobiles.


LAPEER-TRAILMOBILE WAY.. Shocks absorbed by floating coupling member
OBSOLETE WAY.. Shocks transmitted to transmission & differential

COUPLING MEMBER CUSHIONS TRACTOR FROM SHOCKS

The king pin which floats and carries no weight, is mounted between two sets of heavy draw-bar springs, and forms a yielding connection between tractor and trailer. Strains due to pulling, stopping and starting, and shocks due to road conditions, are absorbed by these draw-bar springs. There is free rocking action between tractor and trailer at all angles. King pin moves freely between ball-bearing and roller-bearing guides packed with grease at factory, eliminating wear and possibility of "freezing." An exclusive Lapeer-Trailmobile feature.

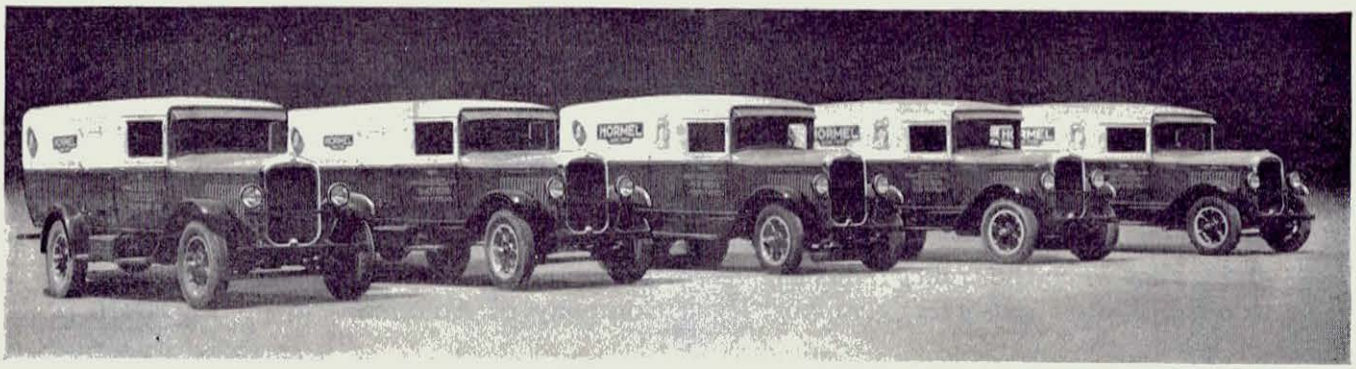
Representatives in all principal cities

LAPEER-TRAILMOBILE

"TRAILERIZE AND ECONOMIZE"

100% CAB CONTROL . . . CHEAPER . . . FASTER . . . SAFER

Balsam-Wool
INSULATION
for refrigerator cars and trucks



Truck bodies built by Cleveland Mfg. Co., Birmingham, Ala.

ELASTIC*
WIND-PROOF
FLEXIBLE

EFFICIENT
LIGHT-WEIGHT
DURABLE

***Because of its elasticity, Balsam-Wool is not damaged by the twisting and jolting of moving vehicles. Long years of service in thousands of cars and trucks have firmly established the unexcelled efficiency and durability of**

Balsam-Wool—*true insulation*

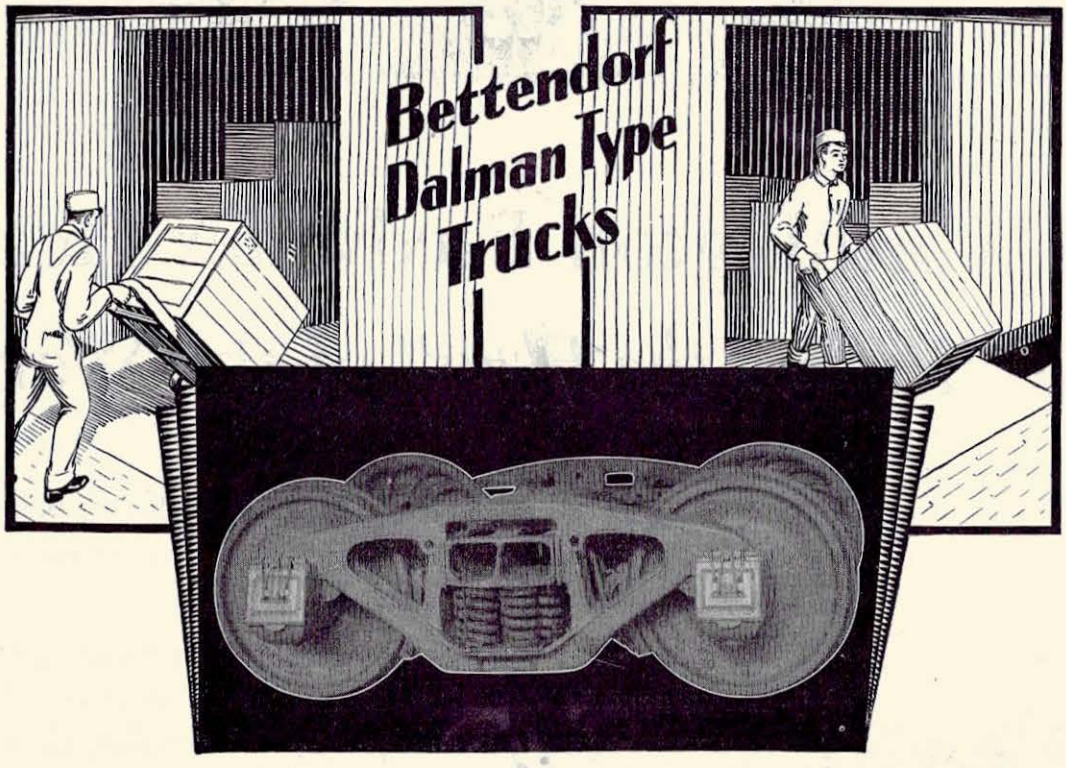
WOOD CONVERSION COMPANY

Mills at Cloquet, Minnesota

Railroad Sales Offices: CHICAGO — 360 No. Michigan Ave.; NEW YORK — 3107 Chanin Bldg.; DETROIT—515 Stephenson Bldg.; SAN FRANCISCO—149 California St.

Maine To California . . .

Easy Riding Dalman Trucks Protect the Freight and Save the Car



The Dalman spring group which gives Bettendorf-Dalman Type Trucks ample reserve spring capacity and unusual shock absorbing ability, can now be furnished in a single cluster as illustrated above if desired.

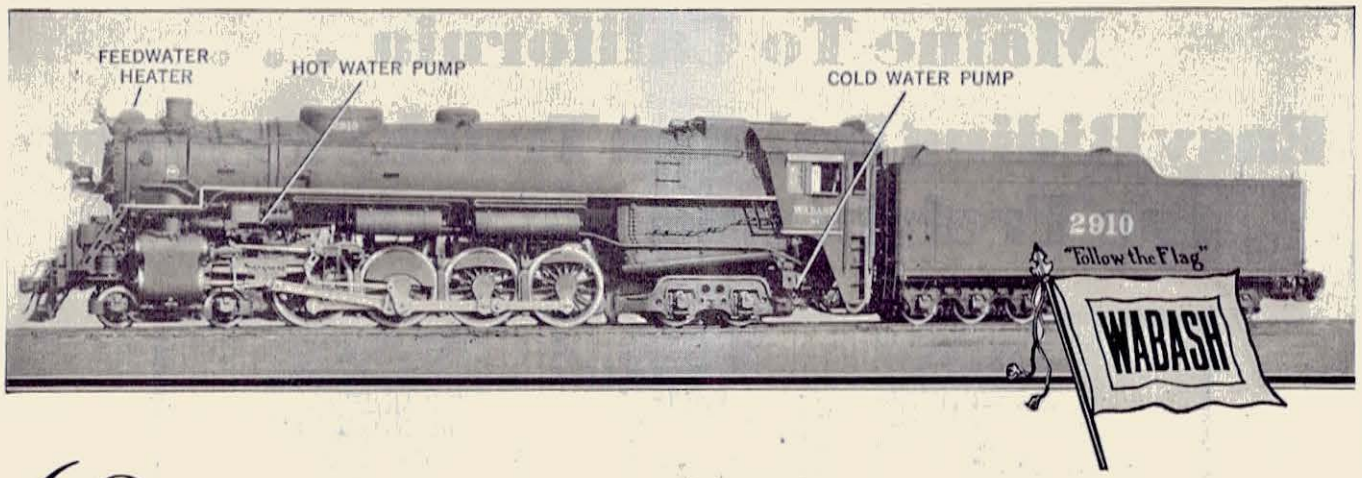
The Dalman Feature Adds Two Standard Coils To Each Spring Group.

SAFELY aboard in Maine and safely off in California. True of valuable and fragile freight as well as sturdy machinery. The Bettendorf Dalman-Type Truck has set at naught the countless potential road shocks that are the constant enemy of freight and car alike.

The road shocks are still there, but they cannot drive home with sickening and costly impact. They are smothered and disciplined within the ample Dalman spring group with its ability to withstand even the more severe of the thumps ever present along the steel highways of trade. Is it any wonder that the more exacting specifications read "Trucks—Bettendorf Dalman Type".

THE BETTENDORF COMPANY

OFFICES AND WORKS BETTENDORF, IOWA



68 Worthington Feedwater Heaters "*Follow the Flag*" of the Wabash

FLIERS de luxe...perishable red ball freight, in fact, all freight...*must* move rapidly on the Wabash.

Eight years ago Worthington Open Type Feedwater Heaters were installed on three locomotives of the Wabash Railway Company. More quickly and forcefully than could any argument, they demonstrated their value. They proved beyond question that they actually saved fuel and water... and removed scale-forming impurities from the water.

These installations were so successful that the Wabash has continually added to them, until now, 68 Worthington Feedwater Heaters "Follow the Flag".

Ask the nearest Worthington office for a copy of Bulletin W-220-B2, describing and illustrating Worthington Feedwater Heating Equipment.

PUMPS
All Sizes...All Types
For All Services
Any Capacity...Any Pressure
COMPRESSORS
Stationary and Portable
CONDENSERS
and Auxiliaries
DIESEL ENGINES
GAS ENGINES
FEEDWATER HEATERS
WATER, OIL and GASOLINE METERS
MULTI-V-DRIVES
ROCK DRILLS
AUTOMATIC HEAT TREATING MACHINES FOR DRILL STEEL
FORGING FURNACES FOR DRILL STEEL
DRILL STEEL
ACCESSORIES
CHROMIUM PLATING

Literature on request

WORTHINGTON PUMP AND MACHINERY CORPORATION
Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N.Y. Holyoke, Mass.
Executive Offices: 2 Park Avenue, New York, N.Y.
GENERAL OFFICES: HARRISON, N. J.
District Sales Offices and Representatives:

ATLANTA	CHICAGO	DALLAS	EL PASO	LOS ANGELES	PHILADELPHIA	ST. PAUL	SEATTLE
BOSTON	CINCINNATI	DENVER	HOUSTON	NEW ORLEANS	PITTSBURGH	SALT LAKE CITY	TULSA
BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries

H-47

WORTHINGTON

No Pension System For Freight Cars!

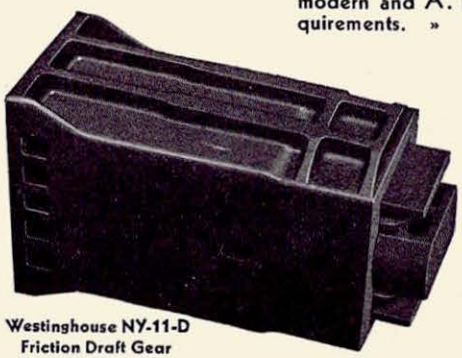
CARDWELL
WESTINGHOUSE
DRAFT GEARS

Made in types and designs to fit any kind of car construction or draft gear attachments on new or old equipment, and in sizes and capacities which meet all modern and A. R. A. requirements. » » » »

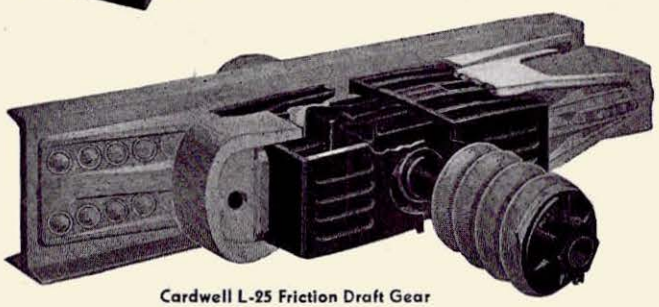
FREIGHT cars are kept in service as long as they can be maintained in safe running condition, because profitable operation depends upon long-time, uninterrupted mileage.

Increase the final earning capacity of your freight cars by replacing inadequate draft gears with Cardwell Westinghouse Draft Gears.

Cardwell Westinghouse Co.
332 So. Michigan Ave. « » Chicago, Illinois
Pittsburgh, Pennsylvania
Montreal, Quebec, Canada



Westinghouse NY-11-D Friction Draft Gear



Cardwell L-25 Friction Draft Gear

Cardwell Westinghouse Friction Draft Gear Type F-2

GOOD DRAFT GEARS MAKE CARS GO FARTHER

Made to Match Their Reputation

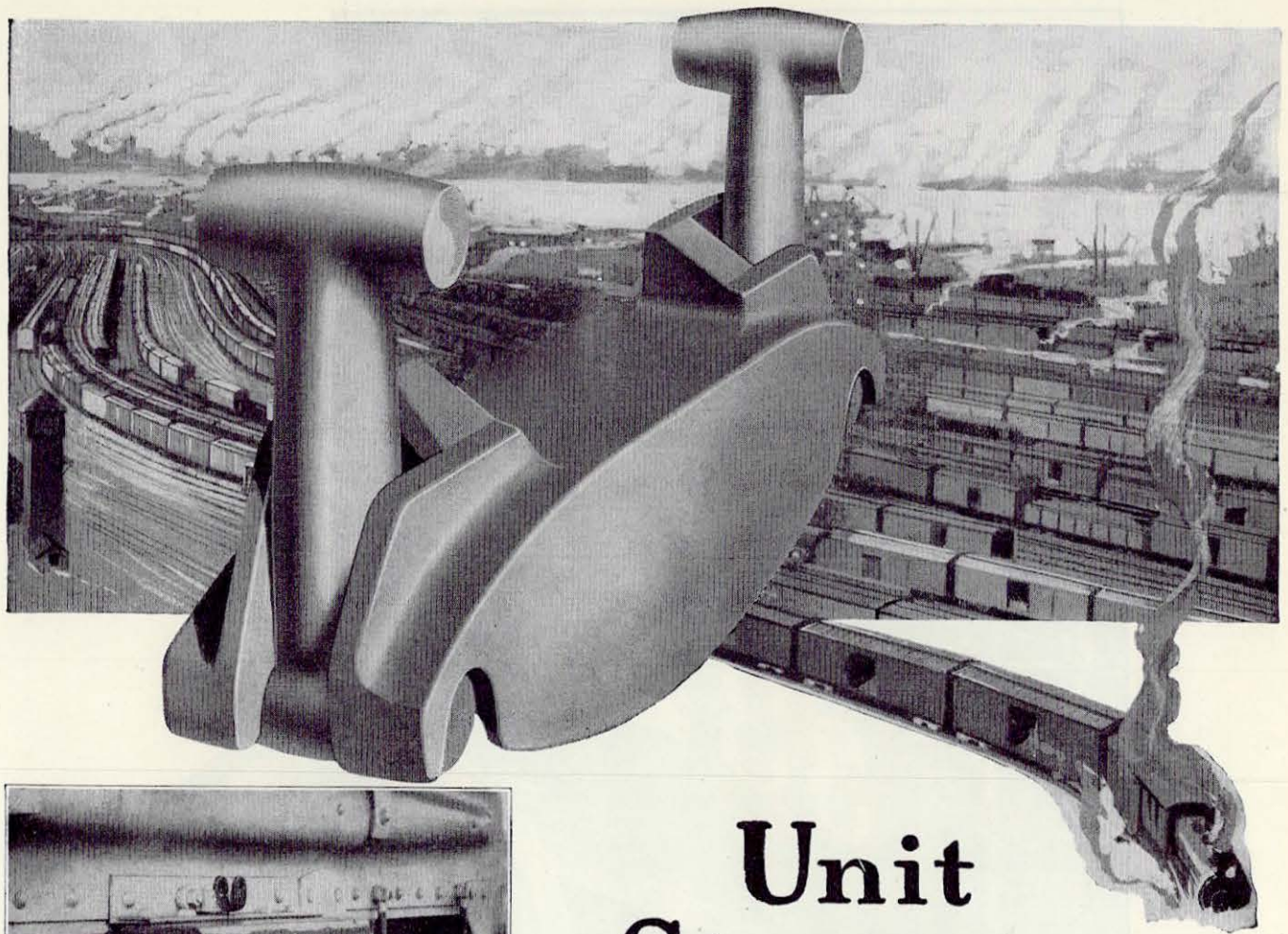
A product can be made to sell—usually at lower prices—or to sustain a reputation it has held for many years. "Railway" Steel Springs, Tires, Wheels and Journal Box Lids are made to meet all possible requirements while upholding the reputation that has made the "Railway" mark a "buy-word" among railway purchasers.

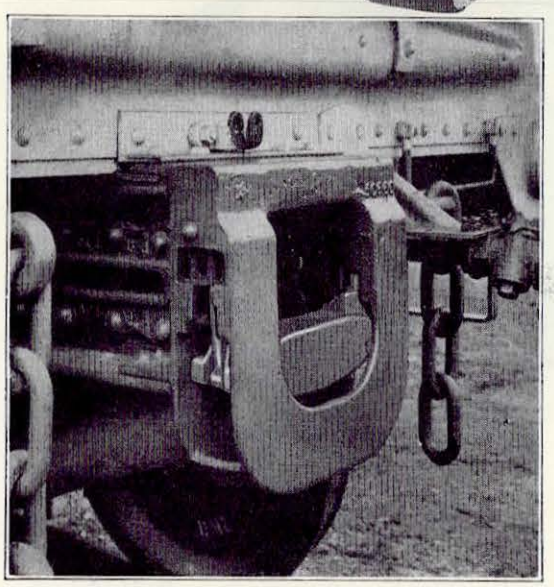
Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

Chicago, Ill.	Detroit, Mich.	St. Louis, Mo.	Pittsburgh, Pa.	Montreal, Que.
St. Paul, Minn.	Washington, D. C.	Cleveland, Ohio	Denver, Colo.	San Francisco, Cal.





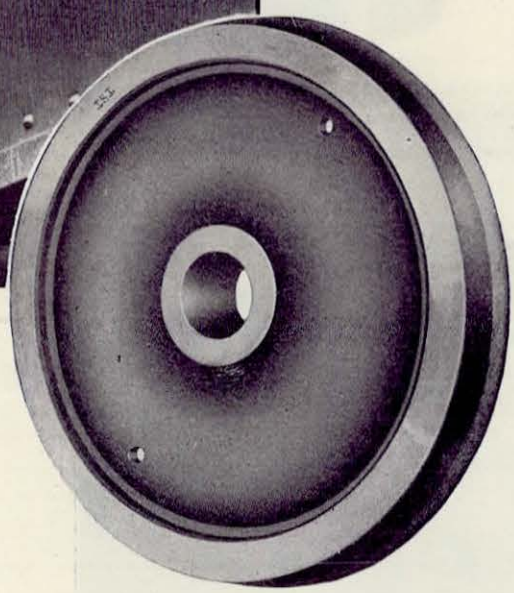
Unit Structure

The striking casting has an integral bottom tie forming a unit structure in which is mounted the swinging Union Centering Device. Together they give the necessary movable coupler support with the solid center sill bottom tie.

UNION METAL PRODUCTS COMPANY

NEW YORK · CHICAGO · ST. LOUIS · WASHINGTON
RICHMOND · HOUSTON · SAN FRANCISCO · KANSAS CITY · MONTREAL

EWING GALLOWAY



Perfect maintenance of schedules depends not only on the human factor but also on the system and the equipment. "Standard" Q.T. wheels are showing g r e a t l y superior structural strength and wear. Their use simplifies part of the equipment problem — they keep r o l l i n g stock in o p e r a t i o n longer and lengthen the intervals between wheel replacements.

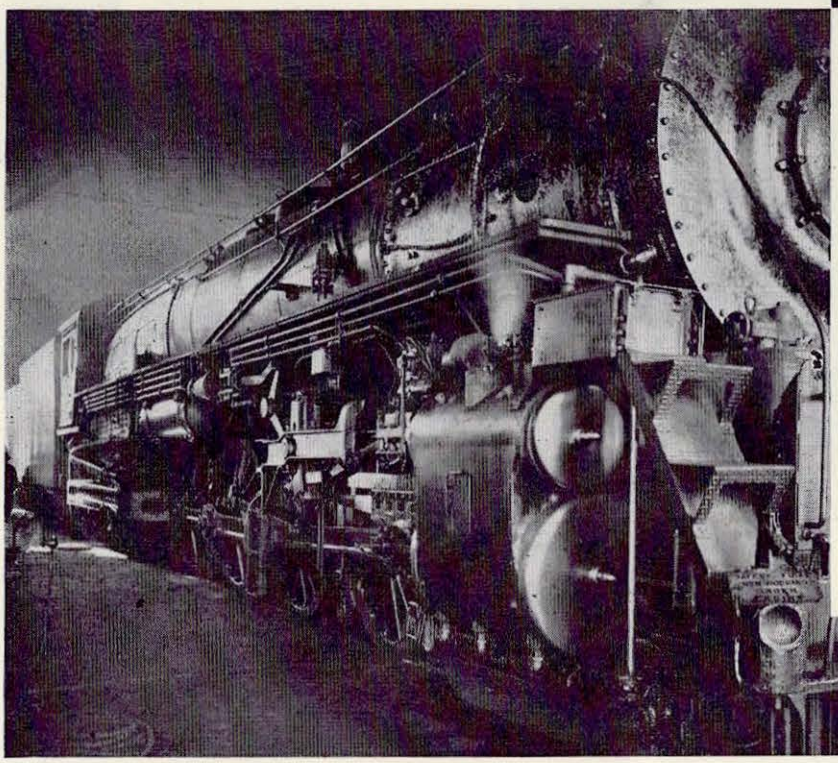
Tires
Rolled
Wheels
Steel Tired
Wheels
Forgings
Steel
Castings
Billets

STANDARD STEEL WORKS COMPANY

GENERAL OFFICE & WORKS:
BURNHAM, PENNA.

CHICAGO ST. LOUIS PORTLAND
NEW YORK AKRON SAN FRANCISCO
PHILADELPHIA

Railroads are Amazed at this Wrought Iron Bending Pipe!



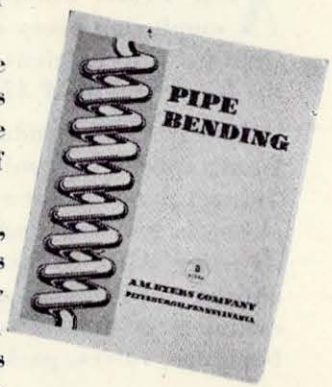
HERE is another wrought iron pipe achievement—by BYERS! Railroads have always had an undiminishing confidence in wrought iron pipe. They have never found its equal—in terms of resistance to corrosion and vibration-fatigue.

Now comes a BENDING PIPE of wrought iron—with the Byers name on it—and railroad men are literally astounded at its performance.

"Torture it? We should say we can! —and it bends more easily and delivers greater economy than anything we ever had before." That's what they tell us. In fact, their shop experience with Byers Bending Pipe exceeds our claims.

Keep this in mind: This bending pipe retains all the valuable characteristics that have characterized Byers Pipe since 1864—and gives the *plusage* of *exceptional bendability* as well.

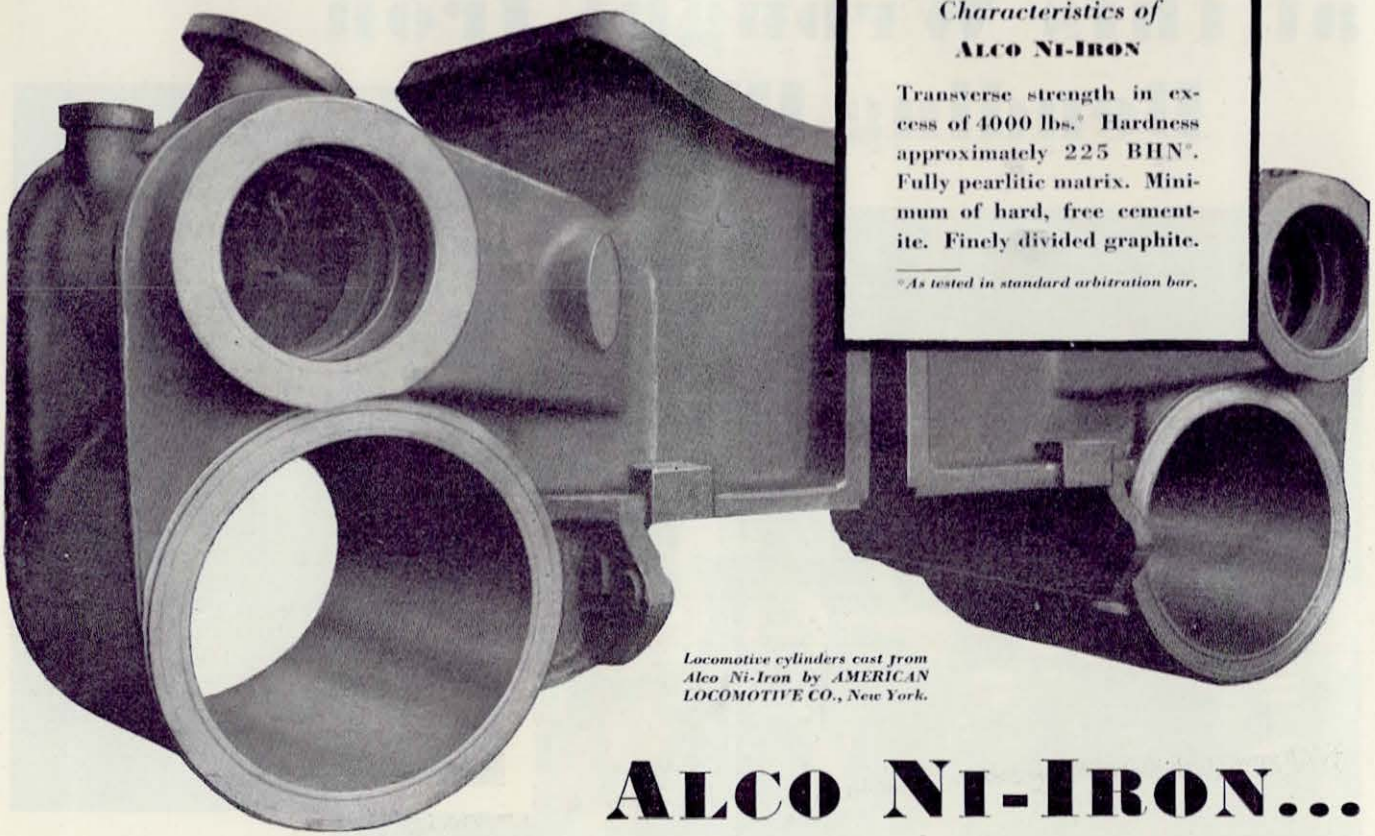
Write today for our Bulletin No. 50, "Pipe Bending." Then order Byers Genuine Wrought Iron Bending Pipe for your next installations. Experience its economy—and how it simplifies heretofore difficult hand or machine bending problems. A. M. Byers Company, Pittsburgh., Pa. Established, 1864.



SEND FOR A COPY

BYERS · GENUINE · WROUGHT IRON BENDING · PIPE ·

AN INVESTMENT · NOT AN OUTLAY



Physical and Structural Characteristics of
ALCO NI-IRON

Transverse strength in excess of 4000 lbs.* Hardness approximately 225 BHN*. Fully pearlitic matrix. Minimum of hard, free cementite. Finely divided graphite.

*As tested in standard arbitration bar.

Locomotive cylinders cast from Alco Ni-Iron by AMERICAN LOCOMOTIVE CO., New York.

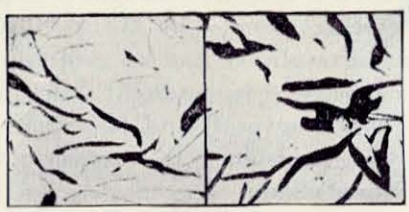
ALCO NI-IRON...

an improved material for modern railway service

AT A TIME when railroads throughout the country are employing every effort to reduce costs and at the same time provide efficient passenger and freight transportation, the introduction of Alco Ni-Iron assumes special importance.

Alco Ni-Iron, produced by the American Locomotive Co. from a special base mixture containing Nickel, was developed to meet the need for an alloyed cast iron having exceptional strength, toughness and wear-resistance. In locomotive construction Alco Ni-Iron provides longer wear and improved resistance to impact and operating stresses in such parts as cylinders, cylinder bushings, pistons, piston rings, piston valve bushings, valves, packing rings, shoes and wedges.

Because it retains, in the center of heavy sections, a higher percentage of its arbitration bar strength, Alco Ni-Iron is particularly adaptable for heavy castings. Tests on 4" sections turned to 1¼" dia. showed an average tensile strength of 28,000 p.s.i. as against 15,000 p.s.i. for gray iron. These same irons cast in standard arbitration bar sections—1¼" dia. tested 40,000 p.s.i. for Alco Ni-Iron and 32,000 p.s.i. in gray iron. Yet the additional cost represented by the Nickel addition is so small in proportion that it can scarcely be a factor to the railroad seeking longer-wearing material.



Above: *Left*
Photomicrograph taken from 4" dia. test bar of Alco NI-Iron

Above: *Right*
Photomicrograph taken from 4" dia. test bar of regular cylinder iron

Magnifications x 100

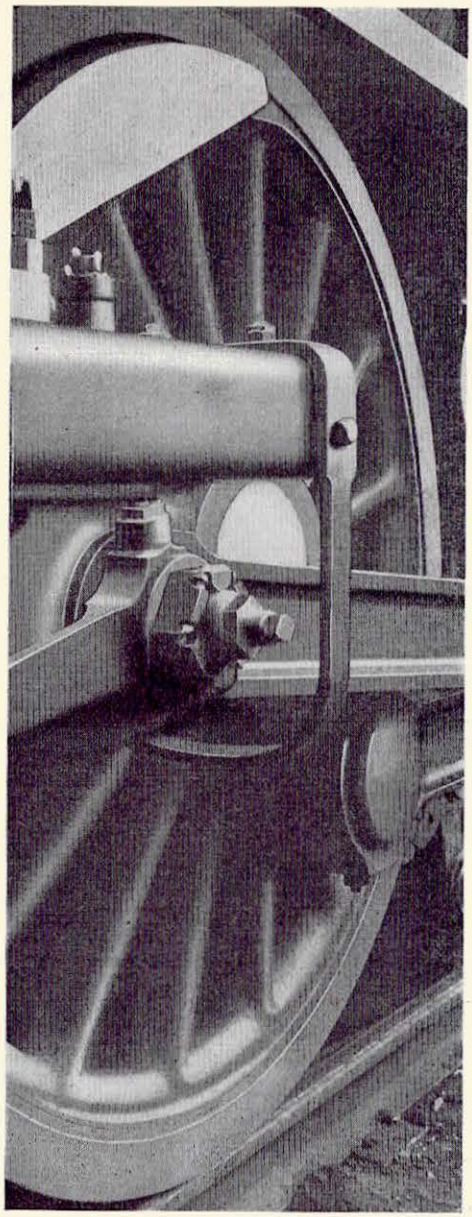
Nickel
CAST
IRON
A BETTER MATERIAL FOR MODERN NEEDS

INCO NICKEL

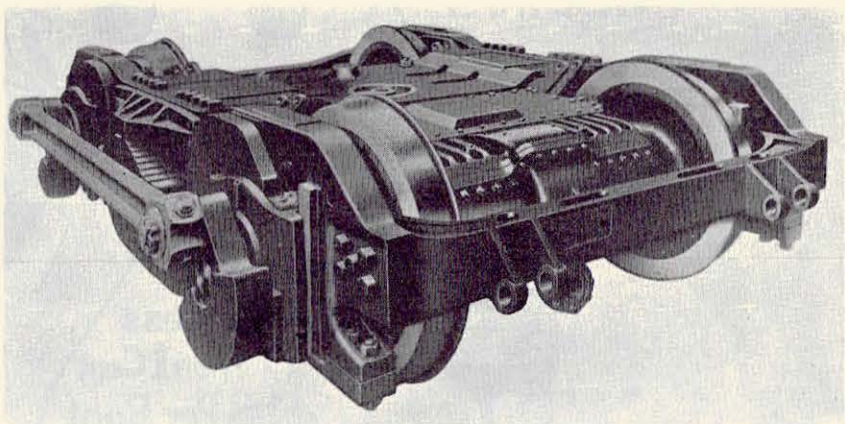
Our casting specialists will gladly discuss your problems with you.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

TWO ELEMENTS THAT MAKE UNIVERSAL MOTIVE POWER



• HIGH WHEELS AND A BETHLEHEM Auxiliary Locomotive



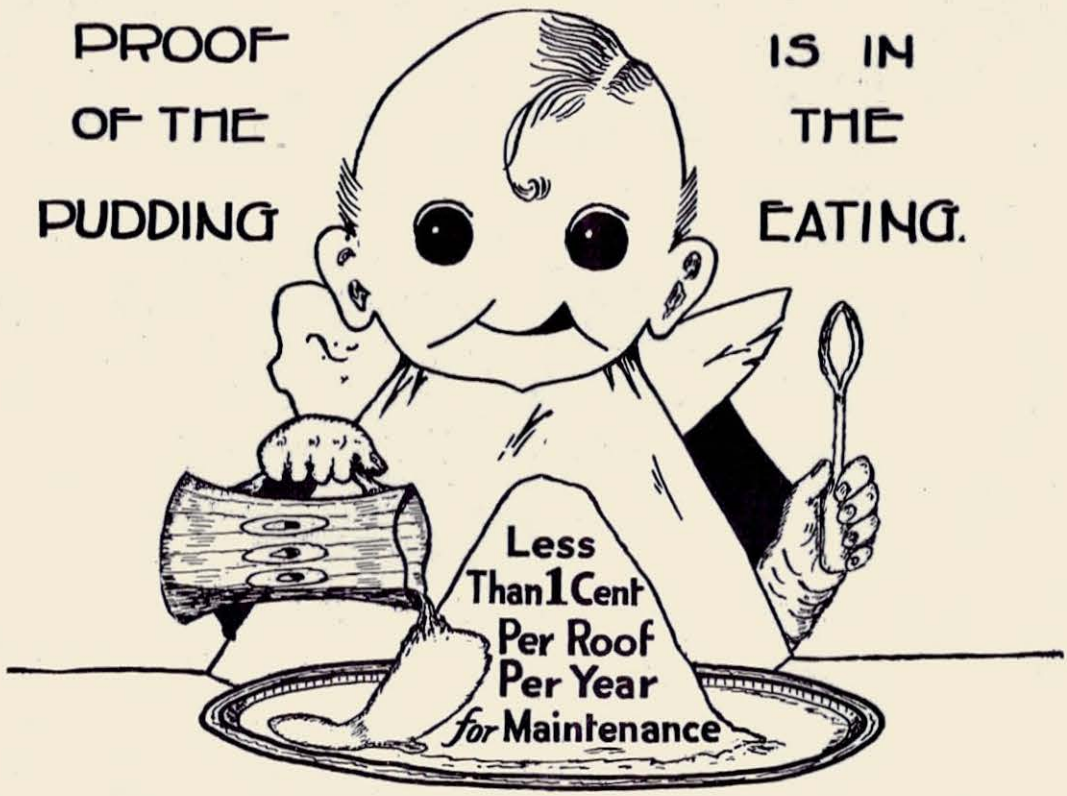
A high-wheel engine with a Bethlehem Auxiliary Locomotive under the tender is a power unit capable of working efficiently under any conditions that may arise in any class of service, either passenger, fast-freight or slow-freight. Not only is the availability of the one class of engine for all classes of service in itself a highly important factor, resulting in marked economies, but the high-wheel engine so equipped is much more effective in the fast-freight service for which this type of engine is generally used. The added tractive force of the Auxiliary makes possible the starting, without excessive wear and tear on equipment, of trains of a weight that makes full use of the engine's great power at road speeds. Similarly in passenger service the Auxiliary greatly facilitates the starting and acceleration of heavy trains. The same engine is very effective for slow-freight service with the Auxiliary Locomotive to furnish extra tractive effort for starting and getting over ruling grades.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.

District Offices: New York, Boston, Philadelphia, Baltimore, Washington, Atlanta, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis
Pacific Coast Distributor: Pacific Coast Steel Corporation, San Francisco, Los Angeles, Portland, Seattle, Honolulu
Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City.

BETHLEHEM

LONG LIFE LOW MAINTENANCE



WHEN it comes to proving the long life and low maintenance of the Dry Lading Roofs, the best evidence you can get is years of actual records.

Study this one. The cost of roof maintenance, from 1913 to 1930 inclusive on 30,000 Canadian National cars equipped with Dry Lading Roofs, amounted to $4519.49. The average maintenance expense, during this 18 year period, amounted to less than one cent per roof per year.

This performance record, extending over 18 years and covering 30,000 cars, demonstrates without question the great economic value of the Universal Dry Lading Roof.

And the reward is pretty sweet.

Hutchins Car Roofing Company

Federal Trade Commission on "Reciprocal Buying"

The opinion rendered by the Federal Trade Commission in the proceedings against the Waugh Equipment Company and certain officers or former officers of Armour & Company for using unfair methods of competition, a summary of which was published in the *Railway Age* of October 17, is a very significant document.

For about three years the *Railway Age* has been criticizing the practice of so-called "reciprocal buying," and insisting that it involves unfair competition, and, in the long run, must be highly inimical to the railroad industry, and also to the railway equipment and supply manufacturing industry. The facts and conclusions presented by the Federal Trade Commission, in this opinion, after a thorough investigation and numerous hearings, fully support these contentions, and show that the practice is indefensible from every standpoint. The facts demonstrate that when the traffic of a big shipper is allowed to influence the purchases of railways, it tends rapidly to become the paramount consideration in determining from whom purchases shall be made.

Armour Officers in Draft Gear Business

From January 1, 1921, to July 31, 1924, the sales of the Waugh Draft Gear Equipment Company amounted to only about six thousand dollars. In 1924 A. J. Pizzini and T. E. Bragg, promoters of a new Waugh Equipment Company, gave one-third of their promotion stock, or 1,666 shares, to Arthur Meeker, then executive vice-president of Armour & Company, F. W. Ellis, Armour's vice-president in charge of traffic, and J. B. Scott, general manager of the Armour Car Lines and first assistant to Mr. Ellis. Early in 1927 Bragg disposed of most of his stock to the Whitehouse Investment Company, which was created and controlled by the late F. Edson White, then president of Armour & Company, and the rest of it to Messrs. Meeker, Ellis and Scott. Just prior to December 1, 1929, the total amount of common stock held by officers, former officers and employees of Armour & Company amounted to 3,749 out of 7,000 shares. On about that date the Waugh Equipment Company issued 1,666 shares to George A. Hood, trustee of the Swift estate, in exchange for a license to make a device owned by the Mechanical Manufacturing Company, which was controlled by the Swift family. Therefore, subsequent to December 1, 1929, 5,415 shares out of a total of 8,666 shares of common stock were owned directly or indirectly by persons affiliated with Armour & Company and Swift & Company, the meat packers. From August, 1924, until April, 1926, the Waugh Equipment Company sold the type of gear which had previously been manufactured by the Waugh Company, but since that time it has sold a better draft gear.

The effect of the above changes upon the sales of the Waugh Equipment Company to the railroads has been remarkable. In 1924 it sold only 1.5 per cent of the draft gear marketed to the railways by the principal manufacturers; in 1925, 3 per cent; in 1926, 24 per cent; in 1927, 11 per cent; in 1928, 15 per cent; in 1929, 30 per cent, and in 1930 almost 40 per cent. In 1924, when the total sales of the principal manufacturers were 147,065 sets, its sales were only 2,156 while in 1929, when the total sales of the principal manufacturers amounted to 93,598 sets, its sales amounted to 28,293; and in 1930 its sales were 40 per cent greater than those of its nearest competitor.

"Influence Exerted Was Influence of Traffic"

Its rapid progress from seventh place among eight competitors in 1924 to a great lead over all competitors in 1930 cannot be explained by the admitted improvement in its product. "The ordinary procedure followed by the draft gear companies * * * in the sale and distribution of draft gears to the railroad companies before the advent of the respondent corporation and at the present time," said the Federal Trade Commission, "is to first attempt to sell the product to the

mechanical department of the railroad and then to solicit the operating and purchasing officials. No contact is made with the traffic department. * * * There is substantial evidence in the record to show, however, that due to the activities of respondents Meeker and Ellis * * * in many instances the specifications of the mechanical departments of the railroads were broadened to include gears manufactured by the respondent (Waugh) corporation contrary to the recommendation of the mechanical officials and purchases made of said gears regardless of the bids of competitors."

Withdrawal of Traffic

The influence exerted by Messrs. Meeker, Ellis and Scott, in consideration of the stock transferred to them in 1924, "was," said the Federal Trade Commission, "that influence which had been acquired and was then and is now possessed by them by virtue of the large amount of competitive traffic of Armour & Company and its subsidiaries," and this influence was used "to induce and compel various railway companies of the United States to purchase draft gears manufactured and sold by the respondent corporation in preference to draft gears of equal or higher quality manufactured and sold by competitors, by giving the traffic officials of said railway companies, directly or indirectly, promises and assurances of freight traffic to be shipped over the lines of said railway companies by Armour & Company, and its subsidiary corporations, if said railways would purchase draft gears manufactured and sold by the Waugh Equipment Company," and also "by threats of withdrawal, and the actual withdrawal, of freight traffic from the lines of certain railway companies * * * if and when said railway companies would not purchase the draft gears manufactured by the Waugh Equipment Company."

The practices used in promoting the sales of the Waugh Company could not be more definitely stated. These practices were definitely condemned by the commission as "oppressive and coercive in nature" and as tending "to create a monopoly in the respondent corporation in the sale and distribution of draft gears and other railway equipment." The Waugh Equipment Company, Meeker and Ellis were formally ordered to cease and desist from the use of the traffic of Armour & Company and its subsidiaries in the solicitation of draft gear or other railway equipment business from the railway companies.

Tendency to Create Monopolies

The findings made and the order issued are of great importance to the railways and to the companies that sell or seek to sell to them. The tendency of the use of the traffic of big shippers and to create monopolies in the railway equipment and supply manufacturing business has now been formally recognized by a federal tribunal, and has been declared by that tribunal to be unfair competition and therefore in violation of law.

Its tendency to arrest progress in both the railroad and the manufacturing industries is equally apparent. As the Federal Trade Commission said, "The factors ordinarily taken into consideration by the officials of the railroad who purchase draft gears, before the advent of the respondent corporation were, first, quality of the product; second, price of the product, and, third, salesmanship." Under competition in which these factors were the dominant considerations there was necessarily a constant tendency to improve products and reduce prices. Unquestionably it was principally the use of traffic that enabled the Waugh Company to advance within five years in point of sales from the seventh to the first place in the draft gear business; and necessarily the more effective the use of traffic becomes the more will be reduced the incentives to improve products and reduce prices.

There never was a time when the railroad industry could so ill afford as now to reduce the incentives to manufacturers of equipment and supplies to improve their products and reduce their prices. The railways are meeting unprecedented competition from other means of transportation. Their traffic is increasing much more slowly than formerly. Therefore, it has become more essential than ever before for them to reduce their operating costs. Their ability to reduce these costs depends very largely upon their ability to buy improved products at declining prices as a result of progress in the railway equipment and supply manufacturing industry. To allow traffic to dominate generally in determining their purchases, as the record clearly shows it has dominated on many railways within the last five years in the purchase of draft gears, would be in a comparatively few years to establish monopolies from which they would have to buy, and to end all incentive for improvement of quality and reduction of prices.

What Will "Big Business" Do?

What is "big business" going to do about this decision? Is it going to persist in using its traffic to "induce and compel" the railways to make purchases largely in disregard of sound business principles? What, in particular, are Armour & Company and Swift & Company and their officers going to do about a use of their traffic by some of their officers for the benefit of another company which a federal tribunal has so strongly condemned? Congress could put teeth into the law prohibiting unfair competition. Also, it could repeal the provision of the Interstate Commerce act giving shippers full power to route their traffic. As for the railways, do they want regulation applied to their purchases, in addition to all the other regulation they have now?

The trading of purchases for traffic may temporarily benefit individual railways; but it is unmitigatedly

harmful to the railroad industry as a whole; and the present condition of the industry is sufficient to show that the problems of the industry are much more important to each railway than its own particular problems. Such competitive practices as "reciprocal buying" greatly aggravate the problems of the industry and make their solution much more difficult.

The only true reciprocal for the giving of traffic by a shipper is the rendering of good service by the railway at reasonable rates. The only true reciprocal for purchasing by a railway is the furnishing by the manufacturer of good goods at a reasonable price. There is no true reciprocity whatever between purchases and traffic; and the sooner this great and growing abuse of so-called "reciprocal buying" is stamped out the better it will be for both "big business" and the railroads.

Railway Rates, Wages and Unemployment

However confusing it may be in other respects, one thing that the decision of the Interstate Commerce Commission in the 15 per cent rate advance case has made clear and certain is that railway wages must be reduced as soon as practicable. The Commission could not have made this more inevitable if it had been deciding a wage case instead of a rate case.

The drastic retrenchments the railways are continuing to make to prevent the bankruptcy of many of them and the destruction of the credit of the industry are most strikingly illustrated by the continuance of the decline in the number of their employees.

In August, the latest month for which statistics of the Interstate Commerce Commission are available, the number of employees was only 1,288,074, or 226,293 less than in August, 1930, and 471,479 less than in August, 1929. In the first eight months of 1931 the average number of employees was 1,319,170. This was 235,383, or 15 per cent, less than in the corresponding part of 1930; 362,082, or 21½ per cent, less than in 1929; 473,897, or 26.4 per cent, less than in 1926; 553,523, or 30 per cent, less than in 1923, and 718,829, or 35.3 per cent, less than in 1920. The average number of employees in the first eight months of 1931 was about 60,000 less than twenty-five years before in 1906, the year when effective federal regulation of railways was begun.

Wages Highest in History

The average railway wage per hour in 1931 has been about the same as in 1930 when it was 67.8 cents, or the highest in history, the next highest average having been 67.6 cents, which was paid in 1920. Total wages paid in the first seven months of 1931 were, however, only about $1,296,600,000, a reduction of $268,300,000, or 17 per cent, as compared with the amount paid in the corresponding part of 1930, and of almost $397,000,000, or 23.4 per cent as compared with the total paid in the first seven months of 1929. However, the total amount paid employees has not declined relatively anywhere near as much as the net operating income earned for the owners of railway securities. The net operating income earned in the first seven months of the year was $391,300,000 less than in 1929, a decline of 57.0 per cent, and was also 36 per cent less than the amount which was earned in 1930.

Wage Reductions in 1921 Brought Increased Employment

The figures given raise a serious question as to whether railway employees as a whole actually have benefited by the maintenance of wages during the depression. In the last depression the Railroad Labor Board made effective on July 1, 1921, an average reduction of about 12 per cent in wages. This was followed immediately by an increase in the number of employees, which averaged almost 110,000 more in the three months immediately following the reduction of wages than during the quarter immediately preceding their reduction. Wages have been maintained thus far in 1931, and the number of employees has declined instead of increasing since the middle of the year, while the number working only part time has increased.

In the long run, earnings necessarily determine the total amount of wages that can be paid. Consequently if wages are maintained in a period of constantly and greatly declining earnings, the result probably must be a greater reduction in the number of employees than would otherwise occur. Maintenance of wages under such conditions benefits those kept at work at the expense of those that it makes it necessary to lay off. Furthermore, maintenance of hourly wages renders it much more difficult for the railways to effect real economies in operation, and thereby forces them to make greater retrenchments in maintenance than otherwise would be necessary with consequent deterioration of the physical properties.

It is well worthy of consideration whether it would not be beneficial for both employers and employees for them to agree upon sliding scales of wages, adjustments to be made in accordance with major changes in total earnings. The general welfare is promoted when wages normally increase more than the cost of living over periods of years. Experience during the last two years, however, certainly has made it doubtful as to whether it is in the interest of wage earners, industry or the public to maintain money wages during a period of sharply declining prices and earnings, because apparently the inevitable effect is to increase unemployment.

Oil-Electrics Are Effecting Savings In Switching Service

Economic advantages of the oil-electric locomotive have established a definite place for this type of motive power in the railroad yard

THE oil-electric locomotive has found its principal application in switching operations and there are now sufficient performance data available to determine, with reasonable accuracy, the extent to which it can profitably be applied to this class of service. At the present time there are about 125 oil-electric locomotives in service in the United States representing a total of 50,000 horsepower. These include industrial as well as railroad locomotives with horsepower ratings ranging from 120 to 1,000. All but a few of them are used for switching. In the larger units both single and dual power plants are employed and more than a third of the locomotives, most of which are in service on one railroad, are equipped with a storage battery which supplements and receives charge from the main generator.

The three most important characteristics of the locomotive are high availability, low fuel cost and its ability to exert practically full engine horsepower throughout the entire speed range of the locomotive. The latter characteristic is made possible by the electric drive and it is interesting to note in this connection that reports presented recently before the International Railway Congress concerning vehicles driven by internal combustion engines, unanimously agree that when the power transmitted exceeds 150 horsepower, electric transmission is essential. Other characteristics which make the locomotive desirable are no standby losses, good working conditions for the crew, increased safety, reduced track maintenance, reduced locomotive attendant facilities, ability to negotiate curves of short radius and ease of operation. Absence of high-pressure steam and good control make for safety, but switchmen are inclined to offer objections because the locomotive is not easily distinguished from the cars and does not make any sound to announce its starting. To overcome these objections, some users have striped the ends with broad diagonal bands and attached a gong which rings when the locomotive is started from rest.

The distinguishing features of the oil-battery-electric locomotive are that for short periods the battery will permit high power output, much in excess of the engine capacity, and when necessary to run into warehouses, the engine can be shut down and the locomotive operated from the battery alone. When in electrical territory, these locomotives can obtain power from the third rail or overhead wire, under which condition, their performance characteristics are the same as those of a straight electric locomotive.

The first oil-electric locomotive to be used in this country weighed 100 tons and was equipped with a 300-hp. engine. It was employed in switching and transfer service. Its performance was highly satisfactory, but it did not move some of the longer cuts of cars at speeds high enough to satisfy the requirements of this particular application. The 300-hp. units have been found large enough for many applications but larger units are required and this has led to the development of larger oil engines and the use of more than one engine on a locomotive.

The largest oil-electric locomotive built is the two-unit, 2,660-hp. locomotive of the Canadian National. This locomotive has shown some spectacular performance, particularly in passenger service, but it is unlikely that oil-electric motive power will be used extensively on passenger trains. It has been established for switching and may find application in freight service in which the train speed is not so high that very great horsepower is required.

Pitted against all of the desirable characteristics of the oil-electric locomotive, as outlined in the preceding paragraphs, is its relatively high first cost as compared with steam power. Probably the best data available for measuring the performance of oil-electric locomotives are those prepared by the heavy electric traction committee of the American Electric Railway Association and presented on September 28 at the annual convention of

that association. These data as collected are subject to variations because, for example, the different railroads in making out maintenance cost figures do not all include the same list of items. Furthermore, maintenance charges against a locomotive in the shop are often applied in a rather haphazard manner and may be greater or less than they should be. On the other hand there are enough locomotives reported on so that such differences tend to balance out and averages taken from the table represent a reasonably fair picture of what can be expected of the oil-electric locomotive.

A total of 25 oil-electric locomotives were operated in switching service during 1930 an average of 14.55 hours per day, at an average out-of-pocket operating cost, including engine-crew wages, fuel, lubrication, maintenance and other supplies and expenses of $2.61 an hour. This includes fourteen 300-hp. units and eleven 600-hp. units. The figures can be broken down to indicate other interesting comparisons. For example, among the locomotives considered in the previous calculations there are five 300-hp. units operated by two-man crews; nine 300-hp. units operated by one man; and ten 600-hp. units operated by two men. The first five were operated an average of 15.86 hours per day at an average cost of $2.85 an hour. The second nine were operated an average of 12.85 hours per day at an average cost of $1.82 an hour. The 600-hp. locomotives were operated an average of 15.45 hours a day at an average cost of $3.26 an hour.

Maintenance costs for oil-electric locomotives vary considerably for the year, as shown in the A. E. R. A. report, ranging from $2,536 to $6,000 for the 300-hp. units and from $3,177 to $9,830 for the 600-hp. units. The average for the 25 locomotives, some of which have been in service for several years, is about $4,000 for the 300-hp. locomotives and $5,000 for the locomotives of 600 hp. capacity. In practically all cases the companies which operated the most locomotives were able to show the lowest maintenance costs.

Information concerning specific applications is included in the following:

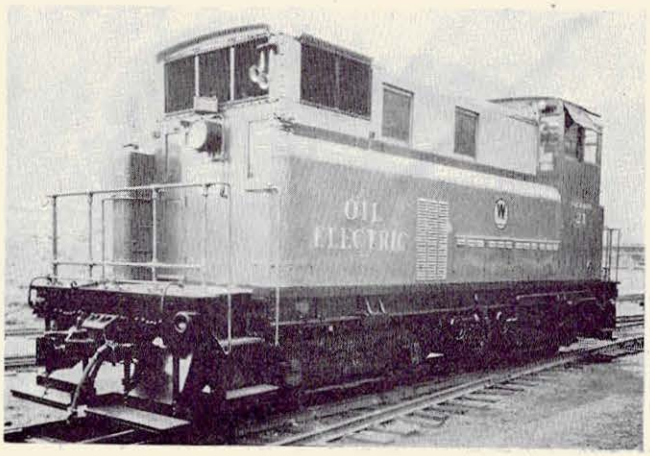
Operating Statistics of Chicago & North Western 300-Hp. Oil-Electric Locomotive No. 1002
June, 1931

Expenses	Month: Last year	Month: This year	Year to date: Last year	Year to date: This year
Crew wages	$910	$577	$5,213	$4,649
Fuel	94	83	625	496
Crank-case oil	67	22	282	127
Other supplies and expenses	27	27	218	123
Total transportation	1,098	709	6,338	5,395
Repairs of motor equipment, Labor	92	104	1,460	866
Repairs of motor equipment, Material	7	119	1,327	1,612
Total repairs	99	223	2,787	2,478
Depreciation	259	259	1,554	1,554
Total maintenance	358	482	4,341	4,032
Total operating expenses	$1,456	$1,191	$10,679	$9,427
Performance				
Hours scheduled to operate	640	688	4,096	3,572
Hours operated	568	645	3,256	3,191
Hours not operated account repairs	72	43	840	381
Hours not operated account repairs, per cent	11	6	21	11
Fuel, gallons	2,039	2,035	11,782	11,371
Fuel, price per gallon	$.046	$.041	$.053	$.044
Crank-case oil, gallons	105	35	435	228
Energy generated, kw.-hr.	11,928 (est.)	13,545	68,376	67,011
Averages				
Cost per Hour				
Transportation	$1.933	$1.099	$1.947	$1.691
Repairs	.174	.346	.856	.777
Depreciation	.456	.402	.477	.487
Total operating expenses	$2.563	$1.847	$3.280	$2.955
Comparative cost per hour for steam service (estimated)	$5.248	$5.248	$5.248	$5.248
Saving per hour (estimated)	$2.685	$3.401	$1.968	$2.293
Gallons per hour				
Fuel	3.59	3.16	3.62	3.56
Crank-case oil	.185	.054	.134	.071
Estimated savings—Motor compared with steam operation	$1,525	$2,194	$6,409	$7,319

Ingersoll-Rand 300-Hp. Unit Used by the Chicago & North Western

Oil-Electrics on the Chicago & North Western

The Chicago & North Western now has four locomotives of the oil-electric type in industrial yard switching in the Chicago district. Three of these are of 300 hp. each, the first having been in service slightly over five years. The fourth locomotive, of 600 aggregate horsepower, driven by two 300-hp. oil engines, was placed in service in August, 1930, and has, therefore, been in service slightly over one year. All of these locomotives are in 24-hour service being operated satisfactorily for the past year with only one man in the cab. The only daily attention which these locomotives receive is the supply of fuel oil, lubricants, sand, etc., as needed. Every two weeks, each locomotive is sent to the engine-house, where a machinist takes about two hours in cleaning the fuel-oil filter and attending to minor mechanical details, and an electrician spends two hours checking and tightening electrical connections. Once a month, each locomotive is taken out of service for eight hours for the regular monthly inspection, at which time the bearings are adjusted, if necessary, tappets examined and all electrical connections and contacts checked. Once a year, each locomotive is taken out of service long enough to remove the trucks and electric motors, turn the commutators, pull the oil-engine pistons and give all parts of the locomotive a thorough inspection



Westinghouse 400-Hp. Locomotive

and such repairs as may be necessary. While the inspection at this time is most thorough, general repairs, including the extensive renewal of engine parts and accessories, have not been necessary, even in the case of the locomotive which is five years old. With the improved materials used in main and connecting-rod bearings, for example, the wear is in many cases only about .002 in. per year.

The 300-hp. units handle up to 20 loads, accelerating rapidly and burning approximately 25 gal. of light fuel oil in eight hours. They are favored by enginemen because of their easy operation and the relative freedom from smoke and noise.

Operating Statistics of Chicago & North Western 600-Hp. Oil-Electric Locomotive No. 1200 June, 1931

Expenses	Month	Year to date
Crew wages	$397	$3,742
Fuel	170	1,073
Crank-case oil	15	116
Other supplies and expenses	29	124
Total transportation	611	5,055
Repairs of motor equipment, labor	85	842
Repairs of motor equipment, material	7	362
Total repairs	92	1,204
Depreciation	423	2,538
Total maintenance	515	3,742
Total operating expenses	$1,126	$8,797
Performance		
Hours scheduled to operate	440	2,705
Hours operated	417	2,487
Hours not operated account repairs	23	218
Hours not operated account repairs, per cent	5	8
Fuel, gallons	4,090	24,603
Fuel, price per gallon	$.041	$.044
Crank-case oil, gallons	20	169
Energy generated, kw.-hr.	....	....
Averages		
Cost per hour		
Transportation	$1.465	$2.033
Repairs	.221	.484
Depreciation	1.014	1.020
Total operating expenses	$2.700	$3,537
Comparative cost per hour for steam service (estimated)	$5.248	$5.248
Saving per hour (estimated)	$2.548	$1.711
Gallons per hour:		
Fuel	9.81	9.89
Crank-case oil	.048	.068
Estimated savings—motor compared with steam train operation	$1,063	$4,255

In the table of operating data for one of the 300-hp. oil-electric locomotives for the month of June, 1931, a comparison is afforded with June of the previous year, as well as the cumulative totals for each year. The substantial saving in total operating expenses over the previous year was largely due to the elimination of the second man in the cab, who has been found unnecessary either for the satisfactory operation of the locomotive, or in the interests of safety.

Reference to the performance figures will show that this locomotive for a typical month (June) was in practically 24-hour service, being held out for repairs only six per cent of the time. It burned in that month 2,035 gal. of fuel oil, or 3.16 gal. per hr., and used 35 gal. of crank-case oil. The total operating cost was $1.847 per service-hour, which may be compared with an estimated cost of $5.248 per service-hour for steam operation. With this single unit, therefore, the saving for the month of June, as compared with steam service, was $2,194 or $7,319 for the year 1931, up to and including June.

The 600-hp. oil-electric switcher No. 1200 on the Chicago & North Western will handle 85 loads and empties, aggregating 1,950 tons, and burn approximately 80 gal. of fuel oil in 8 hours. It is used in industrial switching and to a limited extent in light transfer service. The statement of the performance of this locomotive indicates an availability of 95 per cent for June, 1931, and a total operating cost for that month, of $2.700 per hour. This may be compared to $5.248 per hour estimated cost for equivalent steam service, or a total saving of $1,063 in June, 1931; cumulative for 1931, $4,255.

Illinois Central Diesel-Electric Locomotives

The Illinois Central now has in service six 600-hp. oil-electric locomotives, No. 9000 to 9005. These locomotives are used in the downtown business district of Chicago for short industrial switching, being in practically 24-hour service. They receive daily inspection and the provision of necessary supplies, including fuel oil, lubricating oil, sand, etc., at an elevated track conveniently located at the South Water street yard. These locomotives receive monthly inspection, in accordance with the Interstate Commerce Commission requirements, at the Twenty-Seventh street enginehouse. They receive a more thorough back shop inspection and overhauling annually.

Comparative Operating Cost per Service-Hour of Steam and of Oil-Electric Locomotives at the Chicago Terminal of the Illinois Central

	Steam locomotive	Oil-electric 9000-class locomotive
Engine crew's wages	$1.635	$1.642
Fuel or power	1.029	.336
Water	.104	....
Lubricants	.033	.049
Other supplies	.033	.006
Enginehouse supplies and expenses	.658	.031
Maintenance	1.469	.576
Total cost per service-hour	$4.961	$2.64

One of the tables shows the comparative operating cost of steam and oil-electric locomotives on a service-

American Locomotive Company 600-Hp. Unit in Operation on the New York, New Haven & Hartford

hour basis at the Chicago terminal. The crew expense is practically the same, as an engineman and fireman are used in each case. The fuel cost per service-hour, however, is reduced from $1.029 to $.336. Water expense is eliminated, the cost of lubricants slightly increased, enginehouse expense practically eliminated; and maintenance reduced from $1.469 to $.576 per service-hour. The total operating cost per service-hour is reduced from $4.961 to $2.64, or nearly 50 per cent.

In the foregoing discussion of the cost of operation of the oil-electric locomotives attention has been confined to the direct, or out-of-pocket, operating costs in the case of the averages derived from the study of 25 locomotives in the A. E. R. A. report and with the addition of depreciation charges on the C. & N. W. locomotives. On a similar basis of out-of-pocket operating costs averages for a number of roads indicate hourly costs of operating steam locomotives running about five dollars an hour. Were a detailed study of these costs to be made, however, it would be found that they will vary widely from the average, depending upon the character of the steam locomotive performing the service. Where relatively large steam switching power is employed, the average may be considerably exceeded. It may also be considerably exceeded where old locomotives of relatively light capacity are employed. Many of these old locomotives are exceedingly expensive to maintain, considering the value of the service which they are capable of performing, the cost of maintenance, when allocated to the hours of service, accounting for fully one half of the total costs. In such specific cases hourly costs upwards of six dollars are likely to obtain. Many locomotives of this kind are being used in industrial switching service.

Using the averages in each case, it is evident that there is a difference in out-of-pocket operating costs per hour of locomotive service of approximately two dollars in favor of the oil-electric locomotives operated with two-men crews and of nearly three dollars when operated with one-man crews. Considering the variations in steam locomotive conditions, which must be taken into account in making comparisons in specific cases, it may be conservatively stated that differences in hourly operating costs in favor of the oil-electric locomotive will range from two dollars to four dollars an hour. Depending upon whether conditions permit utilization for a single eight-hour trick or for three tricks a day, the oil-electric locomotive may be expected to effect an annual reduction in out-of-pocket costs varying from $5,000 to $30,000 a year. From this difference must be paid interest and depreciation on the investment involved in the installation of new motive power. Where the best conditions for economy of steam service prevail the operating economies of the oil-electric locomotives may not be sufficient to justify the necessary investment to replace this service. At what point within the wide range of conditions represented by the above figures the margin of profit above the carrying charges provides a sound basis for investment will depend upon the extent to which the high availability of the oil-electric locomotives may be utilized. Where the more expensive steam locomotive service prevails, the low operating cost of the oil-electric locomotive provides the opportunity for an exceedingly attractive investment even though conditions permit of their utilization for an average of considerably less than a full three-trick service.

In Next Week's Issue

Progress in the excavation of rock and earth and in the handling of all manner of heavy and bulky materials employed in the construction and maintenance of railway tracks and structures has long since served to displace manual labor in such operations. The field for further economy in such operations lies not in the displacement of men, but in the use of the more efficient and effective machines that have superseded the railroad steam shovel and the primitive steam derrick. Special service cars, tractors, spreaders and other appliances also have an important place in the program for cutting the costs of handling materials.

Reduced Barge Rates On Cotton Suspended

WASHINGTON, D. C.

ALTHOUGH General Ashburn's Inland Waterways Corporation is not used to having its rates regulated, a way has been found to introduce the Interstate Commerce Commission's practice of suspending rates into its affairs in an extreme instance—one sufficiently extreme to interest the President of the United States.

Announcement was made by the War Department on October 17 that Acting Secretary of War Payne had suspended pending further hearing a sharp reduction in barge rates on cotton, described as "certain rates from Caruthersville, Memphis and Helena to New Orleans in barge load lots," promulgated by the traffic manager of the corporation on October 6 after having been approved by the chairman. It is understood that the certain rates referred to include the rate of $1 per bale, the equivalent of 20 cents per 100 pounds, from Memphis to New Orleans, which was the subject of a conference between a number of southern and southwestern railroad men and Chairman Brainerd and other representatives of the Interstate Commerce Commission on October 13 and which is also reported to have been the cause of a visit paid to President Hoover on the following day at the White House by L. W. Baldwin, president of the Missouri Pacific, and H. C. Couch, president of the Louisiana & Arkansas. At the conference with Chairman Brainerd the railroad men described this rate as "unjust" and "destructive", not only to railroads but to small cotton dealers and markets, because of the minimum of 2,000 bales on which it was predicated, but it is understood that the commission representatives saw nothing that could be done about it, since the commission has no jurisdiction over the port-to-port rates of the barge line. When the railroad men said they had already taken the matter up with General T. Q. Ashburn, chairman and executive of the Inland Waterways Corporation, it was pointed out to them that only the President and the War Department had any control over the corporation. The railroad men also indicated that they might be able to meet the $1 a bale rate if permitted to make rates for trainload lots but the commission has always frowned on such suggestions

(Continued on page 628)

ices performed at these facilities. The Pennsylvania practice in unloading and sorting perishables for auction without charge in that city is similar to that of the B. & O. as described in the report of that road's presentation appearing in the *Railway Age* of October 17. H. P. Hannum, supervisor of exports, explained the P. R. R. services at the Philadelphia Tidewater Terminal; this joint facility was also described in detail by B. & O. witnesses and thus Mr. Hannum was subjected to no cross-examination.

After Mr. Hannum's appearance, Attorney Hagerty stated that he could see no need of continuing the P. R. R. operating testimony further by calling additional trainmasters; he felt, and Mr. Orcutt agreed, that the record already contained as complete a picture of typical spotting services on the Pennsylvania as it was possible to obtain. Accordingly it was agreed to proceed with the Pennsylvania's traffic testimony.

Mr. Burchmore, while not objecting specifically to the foregoing, nevertheless served notice that he would take the position that the present hearing's examination into spotting services has been "extremely superficial." I. C. C. Attorney R. A. Gwynn's retort to this was that he was unaware that any evidence offered by the National Industrial Traffic League had been rejected. What then, asked Mr. Gwynn, is the basis of its counsel's objection unless the N. I. T. League is endeavoring to dictate to the commission as to how it should conduct this investigation. Whereupon Attorney Hagerty suggested that if Mr. Burchmore felt that the respondent carriers had not made a complete presentation, Mr. Burchmore himself should perhaps be called as a witness. Adjournment for the day brought this interchange to an end.

P. R. R. Traffic Testimony

W. C. Glynn, assistant to the general traffic manager, was the Pennsylvania's system traffic witness; his testimony was supplemented by that of J. T. Johnston, freight traffic manager at Chicago. Mr. Glynn first filed exhibits listing all Pennsylvania and Long Island tariffs covering terminal and accessorial services. Since the New York terminal situation is excluded from the present hearings, there was no testimony relating specifically to the Long Island.

The Pennsylvania, it developed, publishes charges for the loading and unloading of carload freight at several cities on its lines but it performs this service at Philadelphia without extra charge. This exception, Mr. Glynn later explained, is due to the fact that loading and unloading is done at Philadephia pier stations for the convenience of the railroad; thus it became necessary to place other Philadelphia stations on a parity with these pier stations.

Evolution of an Allowance

In response to questions from Attorney Hagerty, Mr. Glynn took a case with which he was familiar and outlined the process whereby a plant gets an allowance. The plant selected had been performing its own spotting without an allowance but in 1926 it asked for the allowance and called attention to other plants which were receiving them. The reply of the Pennsylvania was an offer to do the spotting but it developed that the plant's tracks were not in shape for P. R. R. power. The plant then adjusted the tracks and the Pennsylvania performed the spotting for from six to nine months. The operation was determined to be a costly one and was reported to the terminal allowance committee of the Central Freight Association for the purpose of having a study made to fix the amount of an allowance. A 10-day cost study was made on the basis of current and 1916 costs. (The 1916 costs are still used in the formula for determining allowances.) On the basis of 1916 costs an allowance of $1.28 a car was developed; this was offered to the plant, which at first held out for an allowance based on current costs. The P. R. R., because allowances at other plants were on the 1916 basis, insisted that this basis be accepted or it would exercise its right to perform the spotting. The plant finally accepted the $1.28 per car allowance. In this latter connection Mr. Glynn agreed with Mr. Hagerty that competition, in so far as it relates to keeping all plants on the same basis, is a factor in fixing all new allowances on the 1916 basis. He also agreed with Director Bartel that rail competition is to an extent a factor in granting allowances—if its competitors did not make allowances the Pennsylvania would not.

Later in discussing allowances to plants reached through the absorption of connecting line switching charges, Mr. Glynn said that these "overhead allowances" are really made for competitive reasons; as long as the switching line refuses to make the allowance the line-haul carrier must pay it if it desires to reach the plant involved. If it were not for the competition, he added, the Pennsylvania line-haul rates would carry the goods into such plants with only the necessity of absorbing the switching line's charges. In response to Mr. Burchmore, Mr. Glynn stated that he thought the railroads had made good bargains with industries which receive spotting allowances.

Attorney Gwynn questioned Mr. Glynn at length with reference to the prerequisities to the granting of allowances. The witness insisted that in all instances within his experience the Pennsylvania has stood upon its rights and required in such cases both that it be physically able to perform the spotting involved and that it be permitted to enter the applicant's plant. Attorney Gwynn then asked if some plants were doing their own spotting before they received allowances. Mr. Glynn replied in the affirmative but would not concede that this fact necessarily meant that the railroad had been excluded. He was next asked if the ability of an old switcher to enter a plant would satisfy today's requirement, i. e., Attorney Gwynn wanted to know if plants applying for allowances at this time would be held to different standards as to the physical possibility of the carrier's performing the spotting than were those to which allowances were granted in the days of smaller switching locomotives. Prompted by Mr. Orcutt, Mr. Glynn agreed that a carrier cannot lessen its obligations by acquiring larger locomotives. Is it the general policy, Attorney Gwynn asked later, not to grant allowances to any plants but those of the iron and steel industry? The general policy, said Mr. Glynn, is to stand upon the railroad's rights and perform the services; allowances are granted to other than iron and steel plants where conditions warrant, he added. The granting of the allowance, the witness continued, is a subsequent consideration after an offer to perform the service is made; economy and competition are among the factors entering this subsequent decision.

Mr. Johnston, who followed Mr. Glynn, presented brief testimony with reference to tariffs covering terminal services on the Pennsylvania, Lines West of Pittsburgh. He, in turn, was followed by E. Hart, deputy comptroller, who was questioned by Attorney Hagerty with reference to the handling in the accounts of absorptions and allowance payments. Mr. Hart thought the total of these for a given year could be readily obtained and Mr. Orcutt agreed to furnish any such information which might be required of other

hour basis at the Chicago terminal. The crew expense is practically the same, as an engineman and fireman are used in each case. The fuel cost per service-hour, however, is reduced from $1.029 to $.336. Water expense is eliminated, the cost of lubricants slightly increased, enginehouse expense practically eliminated; and maintenance reduced from $1.469 to $.576 per service-hour. The total operating cost per service-hour is reduced from $4.961 to $2.64, or nearly 50 per cent.

In the foregoing discussion of the cost of operation of the oil-electric locomotives attention has been confined to the direct, or out-of-pocket, operating costs in the case of the averages derived from the study of 25 locomotives in the A. E. R. A. report and with the addition of depreciation charges on the C. & N. W. locomotives. On a similar basis of out-of-pocket operating costs averages for a number of roads indicate hourly costs of operating steam locomotives running about five dollars an hour. Were a detailed study of these costs to be made, however, it would be found that they will vary widely from the average, depending upon the character of the steam locomotive performing the service. Where relatively large steam switching power is employed, the average may be considerably exceeded. It may also be considerably exceeded where old locomotives of relatively light capacity are employed. Many of these old locomotives are exceedingly expensive to maintain, considering the value of the service which they are capable of performing, the cost of maintenance, when allocated to the hours of service, accounting for fully one half of the total costs. In such specific cases hourly costs upwards of six dollars are likely to obtain. Many locomotives of this kind are being used in industrial switching service.

Using the averages in each case, it is evident that there is a difference in out-of-pocket operating costs per hour of locomotive service of approximately two dollars in favor of the oil-electric locomotives operated with two-men crews and of nearly three dollars when operated with one-man crews. Considering the variations in steam locomotive conditions, which must be taken into account in making comparisons in specific cases, it may be conservatively stated that differences in hourly operating costs in favor of the oil-electric locomotive will range from two dollars to four dollars an hour. Depending upon whether conditions permit utilization for a single eight-hour trick or for three tricks a day, the oil-electric locomotive may be expected to effect an annual reduction in out-of-pocket costs varying from $5,000 to $30,000 a year. From this difference must be paid interest and depreciation on the investment involved in the installation of new motive power. Where the best conditions for economy of steam service prevail the operating economies of the oil-electric locomotives may not be sufficient to justify the necessary investment to replace this service. At what point within the wide range of conditions represented by the above figures the margin of profit above the carrying charges provides a sound basis for investment will depend upon the extent to which the high availability of the oil-electric locomotives may be utilized. Where the more expensive steam locomotive service prevails, the low operating cost of the oil-electric locomotive provides the opportunity for an exceedingly attractive investment even though conditions permit of their utilization for an average of considerably less than a full three-trick service.

In Next Week's Issue

Progress in the excavation of rock and earth and in the handling of all manner of heavy and bulky materials employed in the construction and maintenance of railway tracks and structures has long since served to displace manual labor in such operations. The field for further economy in such operations lies not in the displacement of men, but in the use of the more efficient and effective machines that have superseded the railroad steam shovel and the primitive steam derrick. Special service cars, tractors, spreaders and other appliances also have an important place in the program for cutting the costs of handling materials.

Reduced Barge Rates On Cotton Suspended

WASHINGTON, D. C.

ALTHOUGH General Ashburn's Inland Waterways Corporation is not used to having its rates regulated, a way has been found to introduce the Interstate Commerce Commission's practice of suspending rates into its affairs in an extreme instance—one sufficiently extreme to interest the President of the United States.

Announcement was made by the War Department on October 17 that Acting Secretary of War Payne had suspended pending further hearing a sharp reduction in barge rates on cotton, described as "certain rates from Caruthersville, Memphis and Helena to New Orleans in barge load lots," promulgated by the traffic manager of the corporation on October 6 after having been approved by the chairman. It is understood that the certain rates referred to include the rate of $1 per bale, the equivalent of 20 cents per 100 pounds, from Memphis to New Orleans, which was the subject of a conference between a number of southern and southwestern railroad men and Chairman Brainerd and other representatives of the Interstate Commerce Commission on October 13 and which is also reported to have been the cause of a visit paid to President Hoover on the following day at the White House by L. W. Baldwin, president of the Missouri Pacific, and H. C. Couch, president of the Louisiana & Arkansas. At the conference with Chairman Brainerd the railroad men described this rate as "unjust" and "destructive", not only to railroads but to small cotton dealers and markets, because of the minimum of 2,000 bales on which it was predicated, but it is understood that the commission representatives saw nothing that could be done about it, since the commission has no jurisdiction over the port-to-port rates of the barge line. When the railroad men said they had already taken the matter up with General T. Q. Ashburn, chairman and executive of the Inland Waterways Corporation, it was pointed out to them that only the President and the War Department had any control over the corporation. The railroad men also indicated that they might be able to meet the $1 a bale rate if permitted to make rates for trainload lots but the commission has always frowned on such suggestions

(*Continued on page 628*)

Hearings on Railroad Practices

Seventeen railroads appeared at Pittsburgh sessions extending over ten days—Buffalo hearings opened October 20

SEVENTEEN respondent carriers presented testimony during the 10 days of the Pittsburgh, Pa., hearings in connection with the Interstate Commerce Commission's investigation of terminal services of Class I railroads—Part 2 of the general Ex Parte 104 inquiry into railway practices affecting operating revenues and expenses. Adjournment to October 20 at Buffalo, N. Y., came at the close of the October 17 session. Examiner C. W. Bardwell presided at Buffalo; he had been sitting with Director W. P. Bartel of the I. C. C. bureau of service since the opening of the hearings at Boston, Mass., on September 15. Testimony of witnesses for the first 10 roads responding at Pittsburgh was reported in the two previous issues of the *Railway Age*. Other respondents heard in that city were: the Bessemer & Lake Erie, the Union, the Lake Terminal, the Newburgh & South Shore, the Pennsylvania, the Wheeling & Lake Erie and the Erie.

Bessemer & Lake Erie

The first Bessemer & Lake Erie witness—F. I. Snyder, vice-president and general manager—made an opening statement listing the several short-line railroads and industrial common carriers with which the B. & L. E. interchanges traffic. The B. & L. E., Mr. Snyder said, has no direct connection with any plant to which it makes an allowance; it does, however, make a spotting allowance, based on actual cost but not to exceed $1.04 per car, to the Erie City Iron Works, which it reaches by absorbing switching charges of the New York Central. Four plants of the iron and steel industry on the B. & L. E. perform their own spotting without allowances. With one exception, Mr. Snyder said these plants have not requested allowances. One did, however, make such application about a year ago and later withdrew the request; the reason for the withdrawal Mr. Snyder did not know. The experience of this witness was that, because of the volume involved, the spotting cost per car is less at larger industries.

E. Campbell, general freight agent, followed Mr. Snyder and presented rate and tariff testimony. The B. & L. E., Mr. Campbell revealed, absorbs connecting line switching charges, not primarily to influence traffic routing, but to afford to patrons the range of service to which they are entitled. Stations on the Union Railroad, this witness explained, are listed as stations on the B. & L. E. line, the listing being prefixed with a reference to a note explaining the absorption arrangements with the Union. The B. & L. E. reaches points on the East Erie Commercial, the charges of which it absorbs, by absorbing also the switching charges of the Pennsylvania, the New York Central or the New York, Chicago & St. Louis. The McKeesport Connecting and the Pittsburgh, Allegheny & McKee's Rocks it reaches by absorbing, in each instance, Pittsburgh & Lake Erie switching charges. The Western Allegheny and the Unity Railways Company join in B. & L. E. tariffs and receive proportions of through rates.

Charles S. Belsterling, representing the subsidiary railroads of the United States Steel Corporation, acted as counsel for the B. & L. E. and also directed subsequent presentations on behalf of the Union Railroad, the Lake Terminal and the Newburgh & South Shore. The Union, serving in the main the Homestead Works of the Carnegie Steel Company, publishes switching charges ranging from 15 to 28 cents a ton which are absorbed by its trunk-line connections. The Lake Terminal publishes a switching charge of 13 cents a ton which is absorbed by connecting line-haul carriers; this road derives the bulk of its traffic from plants of the National Tube Company. While the principal shipper on the Newburgh & South Shore is the American Steel & Wire Company, it developed that this road also serves 54 plants which have no relationship whatever with the United States Steel Corporation or any of its subsidiaries. Newburgh & South Shore charges of 15 and 16 cents a ton are absorbed by its trunk line connections.

Pennsylvania

The presentation of the Pennsylvania, to include also the Long Island, opened late in the season of October 13. G. Orcutt, assistant general solicitor, stated that it was his plan to present system witnesses who would offer general operating, demurrage, per diem and traffic testimony. To supplement this general testimony he had available other witnesses qualified to testify in detail as to any specific operation or territory. J. R. Downes, chief of freight transportation, was the first of the system witnesses; his jurisdiction extends also to the Long Island. Mr. Downes first read a brief statement defining the extent of the P. R. R. lines and then identified an exhibit embracing a classification of short-line and industrial railroads and private industrial tracks served by the Pennsylvania. In compiling this exhibit the Pennsylvania followed the general rule of considering two or more tracks to be a system.

In opening the cross-examination I. C. C. Attorney A. G. Hagerty asked Mr. Downes what considerations determined the granting of an allowance to an industry for performing its own spotting. The witness' reply was that allowances are a matter of economy and mutual convenience. The operating officer, he later told Director Bartel, considers an allowance on the basis of whether or not it will aid him in keeping down the costs in his department.

Mr. Downes was followed by E. T. Kennan, superintendent of car service, who appeared as the system witness on per diem. Mr. Kennan outlined the history of present per diem rules and charges, covering also the rules governing the granting of per diem reclaims to switching carriers. Most of his cross-examination related to a per diem arrangement which the Pennsylvania has with the Norfolk & Western in connection with cars of coal concentrated at lake ports prior to the opening of lake navigation. Under the plan, if the coal is held in other than P. R. R. cars, the Pennsylvania pays the regular per diem to the car owner and receives back 50 per cent of these payments through its reclaim on the N. & W. Mr. Kennan told Director Bartel that this is no violation of per diem rules—it is merely an agreement to cover per diem on cars held for the account of both the P. R. R. and the N. & W.

The foregoing plan, the witness explained, is of long standing, and when it was started most of the lake cargo coal, which is involved, came from points on the N. & W. Asked by Director Bartel if the L. & N. wouldn't like to have such an arrangement also, Mr. Kennan replied that, on the contrary, the L. & N. and the C. & O. refused to participate. Then, the director suggested, it is a case of the N. & W. helping out the P. R. R., but the witness said he had never seen it in that light alone. In response to Mr. Orcutt he added that it is merely an agreement between railroads which doesn't affect shippers or car owners in any way.

General demurrage testimony was presented by H. S. Bevan, special agent, accounting department. Mr. Bevan's testimony was largely a discussion with Director Bartel of demurrage rules, their technical application and the meaning of certain terms in the demurrage tariffs.

Mr. Downes was recalled at the opening of the October 14 session for some general questions from Attorney Hagerty on terminal switching and spotting services. The witness said that the physical situation in each particular territory determines the cost of these services. In general, he explained, all types of switching moves are relative—service at industries might be more costly in one place and team track services more expensive at another. The number of cars to be delivered at a particular spot is quite a controlling factor, he added.

Colloquy Between Burchmore and Director Bartel

Following this testimony of Mr. Downes there came a conference between P. R. R. and I. C. C. counsel for the purpose of determining the order of subsequent Pennsylvania evidence. It developed that the Pennsylvania planned to make a complete presentation at Pittsburgh since the carriers were permitted to elect the point at which they would respond. But J. S. Burchmore, representing the National Industrial Traffic League, objected to this, saying the procedure outlined was unfair to Chicago shippers who might have expected that facts as to the Chicago situation would develop in that city. This remark precipitated an off-the-record interchange between Mr. Burchmore and Director Bartel, prompting the latter to ask, on the record, "Do you think this hearing is being conducted unfairly?"

"Legally I think it is most unfair to conduct a hearing without having the issues clearly defined," said Mr. Burchmore.

"The issue is clearly defined in the commission's order of investigation," was the director's reply which concluded the discussion.

Services at Iron and Steel Plants

F. J. Perry, trainmaster of the Erie and Ashtabula division, was the next Pennsylvania witness. Mr. Perry was first led through brief descriptions of spotting services performed at several plants within his territory. In the course of such testimony he mentioned a Youngstown plant of the Republic Steel Corporation at which the Pennsylvania performs spotting services for all carriers under a pooled power plan; Director Bartel questioned the witness at length on this situation. It developed that all carriers serving this plant leave cars on designated inbound tracks from which point P. R. R. locomotives assigned to the plant do the spotting. Cars are moved from these inbound tracks, the witness said, only on orders from the yardmasters in the employ of the plant; such orders, however, are not necessarily written. Little drilling of cars on the inbound track is required to execute these spotting orders, Mr. Perry said.

In the foregoing connection, C. H. Burgess, representing the Youngstown Chamber of Commerce, brought out that all cars are brought down and placed on the inbound tracks without specific orders from the plant; also, that conductors know generally the spotting locations for the different commodities. At the particular plant under discussion, the witness also agreed with Mr. Burgess, the conductors would proceed with spotting operations unless spotting locations were occupied by other cars; at other plants, Mr. Perry added, no spotting move is made until an order is received from the plant yardmaster.

Director Bartel next directed Mr. Perry's attention to a plant of the National Malleable & Steel Castings Company at Sharon, Pa., where a spotting allowance of $1.67 per car is granted. The witness conceded to the director that this plant uses small locomotives and track and clearance changes would have to be effected before the Pennsylvania could do the spotting. He told Mr. Orcutt, however, that when the allowance in question was granted the Pennsylvania could have done the spotting as the National has made track changes for its own convenience since receiving the allowance; also, he agreed, the size of the switching locomotives assigned to the territory has changed materially and added that it would be possible to spot in the National plant if the P. R. R. elected to assign one of its Class A switchers to the work.

Returning again to the stand, Mr. Downes testified that he knows of no specific instance on the Pennsylvania where P. R. R. conductors, assigned to a plant, spot cars only on written orders from a yardmaster in the employ of the plant. Director Bartel in this connection called Mr. Downes' attention to the previous testimony of J. L. O'Toole, assistant to general manager, Pittsburgh & Lake Erie. Mr. O'Toole's testimony, as the director recalled it, was that railroad switching crews assigned exclusively to plants were under the jurisdiction of the plant yardmaster. He then asked Mr. Downes if the practice were different on the Pennsylvania. The reply was that as a general rule Pennsylvania crews are subject only to P. R. R. supervisory officers; occasionally, he conceded, as a matter of convenience a plant yardmaster might deal with a conductor but in the majority of cases the conductor gets his instructions from the P. R. R. yardmaster or trainmaster in charge of the switching district.

Mr. Downes was followed by a number of Pennsylvania trainmasters, each of whom presented testimony with reference to his particular territory similar to that presented by Mr. Perry with respect to the Erie and Ashtabula division. In the course of this operating testimony Mr. Orcutt read into the record the 1929, 1930 and 1931 costs per car of spotting services at two plants, one of which is switched by the Pennsylvania and the other by the P. & L. E. under pooled power plans. At the plant switched by the P. R. R. the 1929 costs per car ranged from a low of $2.54 in July to a high of $5.14 in June; in 1930 the high was February, $4.85, and the low September, $2.37. With the exception of the February figure of $4.33 which is the 1931 low thus far, the figures for the first seven months of this year are above those of the previous two. The 1931 high is March with an average cost per car of $6.61. Figures on the plant switched by the P. & L. E. ranged, in 1930, from $1.38 to $2.40 per car, and in the first seven months of this year from $1.68 to $3.14.

Perishables at Philadelphia

C. N. Allen, agent at the Pennsylvania's Philadelphia produce terminal, testified briefly with reference to serv-

ices performed at these facilities. The Pennsylvania practice in unloading and sorting perishables for auction without charge in that city is similar to that of the B. & O. as described in the report of that road's presentation appearing in the *Railway Age* of October 17. H. P. Hannum, supervisor of exports, explained the P. R. R. services at the Philadelphia Tidewater Terminal; this joint facility was also described in detail by B. & O. witnesses and thus Mr. Hannum was subjected to no cross-examination.

After Mr. Hannum's appearance, Attorney Hagerty stated that he could see no need of continuing the P. R. R. operating testimony further by calling additional trainmasters; he felt, and Mr. Orcutt agreed, that the record already contained as complete a picture of typical spotting services on the Pennsylvania as it was possible to obtain. Accordingly it was agreed to proceed with the Pennsylvania's traffic testimony.

Mr. Burchmore, while not objecting specifically to the foregoing, nevertheless served notice that he would take the position that the present hearing's examination into spotting services has been "extremely superficial." I. C. C. Attorney R. A. Gwynn's retort to this was that he was unaware that any evidence offered by the National Industrial Traffic League had been rejected. What then, asked Mr. Gwynn, is the basis of its counsel's objection unless the N. I. T. League is endeavoring to dictate to the commission as to how it should conduct this investigation. Whereupon Attorney Hagerty suggested that if Mr. Burchmore felt that the respondent carriers had not made a complete presentation, Mr. Burchmore himself should perhaps be called as a witness. Adjournment for the day brought this interchange to an end.

P. R. R. Traffic Testimony

W. C. Glynn, assistant to the general traffic manager, was the Pennsylvania's system traffic witness; his testimony was supplemented by that of J. T. Johnston, freight traffic manager at Chicago. Mr. Glynn first filed exhibits listing all Pennsylvania and Long Island tariffs covering terminal and accessorial services. Since the New York terminal situation is excluded from the present hearings, there was no testimony relating specifically to the Long Island.

The Pennsylvania, it developed, publishes charges for the loading and unloading of carload freight at several cities on its lines but it performs this service at Philadelphia without extra charge. This exception, Mr. Glynn later explained, is due to the fact that loading and unloading is done at Philadephia pier stations for the convenience of the railroad; thus it became necessary to place other Philadelphia stations on a parity with these pier stations.

Evolution of an Allowance

In response to questions from Attorney Hagerty, Mr. Glynn took a case with which he was familiar and outlined the process whereby a plant gets an allowance. The plant selected had been performing its own spotting without an allowance but in 1926 it asked for the allowance and called attention to other plants which were receiving them. The reply of the Pennsylvania was an offer to do the spotting but it developed that the plant's tracks were not in shape for P. R. R. power. The plant then adjusted the tracks and the Pennsylvania performed the spotting for from six to nine months. The operation was determined to be a costly one and was reported to the terminal allowance committee of the Central Freight Association for the purpose of having a study made to fix the amount of an allowance. A 10-day cost study was made on the basis of current and 1916 costs. (The 1916 costs are still used in the formula for determining allowances.) On the basis of 1916 costs an allowance of $1.28 a car was developed; this was offered to the plant, which at first held out for an allowance based on current costs. The P. R. R., because allowances at other plants were on the 1916 basis, insisted that this basis be accepted or it would exercise its right to perform the spotting. The plant finally accepted the $1.28 per car allowance. In this latter connection Mr. Glynn agreed with Mr. Hagerty that competition, in so far as it relates to keeping all plants on the same basis, is a factor in fixing all new allowances on the 1916 basis. He also agreed with Director Bartel that rail competition is to an extent a factor in granting allowances—if its competitors did not make allowances the Pennsylvania would not.

Later in discussing allowances to plants reached through the absorption of connecting line switching charges, Mr. Glynn said that these "overhead allowances" are really made for competitive reasons; as long as the switching line refuses to make the allowance the line-haul carrier must pay it if it desires to reach the plant involved. If it were not for the competition, he added, the Pennsylvania line-haul rates would carry the goods into such plants with only the necessity of absorbing the switching line's charges. In response to Mr. Burchmore, Mr. Glynn stated that he thought the railroads had made good bargains with industries which receive spotting allowances.

Attorney Gwynn questioned Mr. Glynn at length with reference to the prerequisities to the granting of allowances. The witness insisted that in all instances within his experience the Pennsylvania has stood upon its rights and required in such cases both that it be physically able to perform the spotting involved and that it be permitted to enter the applicant's plant. Attorney Gwynn then asked if some plants were doing their own spotting before they received allowances. Mr. Glynn replied in the affirmative but would not concede that this fact necessarily meant that the railroad had been excluded. He was next asked if the ability of an old switcher to enter a plant would satisfy today's requirement, i. e., Attorney Gwynn wanted to know if plants applying for allowances at this time would be held to different standards as to the physical possibility of the carrier's performing the spotting than were those to which allowances were granted in the days of smaller switching locomotives. Prompted by Mr. Orcutt, Mr. Glynn agreed that a carrier cannot lessen its obligations by acquiring larger locomotives. Is it the general policy, Attorney Gwynn asked later, not to grant allowances to any plants but those of the iron and steel industry? The general policy, said Mr. Glynn, is to stand upon the railroad's rights and perform the services; allowances are granted to other than iron and steel plants where conditions warrant, he added. The granting of the allowance, the witness continued, is a subsequent consideration after an offer to perform the service is made; economy and competition are among the factors entering this subsequent decision.

Mr. Johnston, who followed Mr. Glynn, presented brief testimony with reference to tariffs covering terminal services on the Pennsylvania, Lines West of Pittsburgh. He, in turn, was followed by E. Hart, deputy comptroller, who was questioned by Attorney Hagerty with reference to the handling in the accounts of absorptions and allowance payments. Mr. Hart thought the total of these for a given year could be readily obtained and Mr. Orcutt agreed to furnish any such information which might be required of other

roads by Director Bartel, who has been reserving decision since the New York hearing on Attorney Hagerty's request for these figures.

Wheeling & Lake Erie and Erie

The Wheeling & Lake Erie and the Erie were the last roads to be heard at Pittsburgh. Each presented operating and traffic witnesses but of these only the Erie operating witness—W. White, assistant general manager, Western district—was subjected to any extended cross-examination. Questioning of Mr. White related mainly to services performed by the Erie at plants in the Youngstown district, where it performs spotting services under a pooled power plan. Erie crews in these cases, Mr. White said, do not work under the direction of plant yardmasters. The latter simply tell the conductors where cars are to be placed, he explained; they are analogous to yard clerks at railroad classification yards. The Erie, M. B. Pierce, assistant general counsel, announced, will present further testimony at the Chicago hearings; it also appeared at the New York sessions, its presentation there being reported in the *Railway Age* of October 3.

Buffalo & Susquehanna

The hearings at Buffalo, originally scheduled for four days, lasted less than one. The Buffalo & Susquehanna was the first road to appear, its witness being A. M. Darlow, vice-president and general manager, and E. M. Meagher, general freight agent. Mr. Darlow first read a statement describing the B. & S. lines and outlining the terminal services which the road performs. The Buffalo & Susquehanna, this statement revealed, serves no industry which performs its own spotting and thus no B. & S. industry receives an allowance. In addition to its trunk line connections this road interchanges traffic with two short line railroads—the Coudersport & Port Allegany and the New York & Pennsylvania. It does not, however, have any direct connection with any industrial or plant facility railroad; it reaches industries on the South Buffalo through connecting trunk lines.

Mr. Meagher testified that the Buffalo & Susquehanna follows the usual practice of absorbing connecting line switching charges at common points; it follows the standard reconsignment and reweighing rules and publishes ferry car tariffs stipulating a 6,000-lb. minimum. Switching charges are not, however, absorbed on non-competitive traffic, Mr. Meagher told Attorney Hagerty. This witness stated that the principal traffic interchanged with the Coudersport & Port Allegany is products and raw materials of tanneries; the New York & Pennsylvania, serving an agricultural section, originates dairy products traffic.

Buffalo, Rochester & Pittsburgh

W. H. Francis, general freight agent, was the first Buffalo, Rochester & Pittsburgh witness; he opened with a general statement citing all B. R. & P. tariffs relating to terminal services. Among these was a reference to an allowance for elevation and storage of ex-lake grain at Buffalo which had previously been mentioned by witnesses for other roads. Mr. Francis' statement explained that rates published from Buffalo on ex-lake grain include a charge of not exceeding one cent per bushel, made by the Buffalo elevators against the grain for elevation and transfer from lake vessels to cars and five days' storage. This charge is retained wholly by the elevator companies as compensation for services performed.

Mr. Francis listed seven plant facility railroads which receive allowances from the B. R. & P. for performing their own spotting. Two of these allowances are in cents per ton; the remaining five range from 71 cents to $1.40 per loaded car. The B. R. & P. also absorbs the switching charges of the Pittsburgh, Allegheny & McKee's Rocks and the South Buffalo in reaching industries on those lines. Likewise reciprocal switching charges of other lines are absorbed by the B. R. & P. at common points. No distinction is made in this latter connection between competitive and non-competitive traffic.

Would Confine Allowances to Steel Plants

Attorney Hagerty, in cross-examining Mr. Francis, directed the attention of the witness to each allowance and asked the reason for the original payment to the industry. The witness explained the cost studies on which the allowances are based but the practice of the B. R. & P., he said, was to follow the other lines; in other words it "made the competitive allowance" as Mr. Francis termed it in one of his answers. This witness later said that allowances which the steel industries receive are the outgrowth of cases before the I.C.C. in which carriers were required to remove discriminations. Generally, he added, the carriers elected to remove the discriminations found by extending allowances to other steel plants which were performing spotting services. It was Mr. Francis' opinion that the railroads would not want to extend the allowances to plants other than those of the iron and steel industry. With respect to other industries, he explained, the carriers can conveniently do the spotting, but steel plants, he held, are in a different class.

Mr. Francis, who appeared intermittently on the stand throughout the B. R. & P. presentation, was later cross-examined along similar lines by Attorney Gwynn. The witness was unable to say whether or not plants now receiving allowances would permit carrier power to enter if the B. R. & P. stood upon its rights to perform the spotting itself. In other words, Attorney Gwynn asked, is there in fact any economy involved in the granting of allowances—if the carrier insisted upon doing the work would the steel plants find it more convenient to accept delivery on a designated track and to perform their own spotting without an allowance? The witness insisted that the allowance was an economy if compared with the cost to the railroad of doing the work; he was not informed as to whether the plants involved would permit carrier power to enter.

Cross-examination of Mr. Francis was here taken up by Charles L. Groom, of counsel for the Conemaugh & Black Lick. Mr. Groom selected a plant outside the iron and steel industry which now performs its own spotting without an allowance and assumed that this plant might demand that either the B. R. & P. do the spotting or grant it an allowance. In such an event, Mr. Groom asked, would not the allowance be granted if it were determined to be the more economical means of effecting the spotting? The witness would not, however, concede that such a set of circumstances would necessarily influence the B. R. & P. to depart from its general practice of confining allowances to steel plants. W. F. Strang, general counsel, in this connection conceded that if any obligation rests upon the B. R. & P. it would of course select the most economical means of discharging such obligation.

G. W. Bennett, transportation assistant, was the B. R. & P. operating witness, although E. F. Ryan, terminal superintendent at Buffalo, was called to answer a few specific questions of I.C.C. counsel. Mr. Ben-

nett's opening statement was a brief description of B. R. & P. switching services in connection with traffic interchanged with short lines, industrial common carriers and plant facility railroads and of the spotting services performed by the railroad at industries having systems of plant tracks.

Mr. Ryan answered Attorney Hagerty's first question, relating to services at a Buffalo plant of the Republic Steel Corporation, which receives an allowance of 90 cents per loaded car for performing its own spotting. Mr. Ryan stated that large eight-wheel switchers can not enter this plant; he would not agree, however, that any physical condition at the plant excludes B. R. & P. power since the railroad has smaller switchers which could serve the plant. He did say that B. R. & P. locomotives, if required to do the spotting, would interfere with the intraplant switching, and that the latter would delay the B. R. & P. locomotives. It was Mr. Ryan's opinion that it was more economical for the railroad to grant the allowance. If it were his own business he "would be glad, mighty glad, to give the Republic the 90 cents a car" to be relieved of the spotting work.

Mr. Bennett explained the contractual arrangements with the B. & O. whereby the B. R. & P. reaches industries in Pittsburgh. Trackage agreements and other contracts permit B. R. & P. trains to operate between Butler, Pa., and Glenwood yard, the B. & O. break-up yard at Pittsburgh. Switching of B. R. & P. traffic from Glenwood yard to Pittsburgh industries is performed by B. & O. power under contract rates. No B. R. & P. locomotives, Mr. Bennett later stated, are assigned exclusively to switching work at any plant; all spotting services performed involve distribution from train yards by yard locomotives.

Pittsburg, Shawmut & Northern

The presentation of the Pittsburg, Shawmut & Northern, the last road to appear at Buffalo, consumed only about a half-hour; its witnesses were F. H. Wells, general freight agent, and J. D. Beaver, general superintendent. Mr. Wells stated that the P. S. & N. serves no large industrial centers nor does it have interchange with switching or industrial lines. Reciprocal switching charges of the Erie are absorbed at Hornell and Friendship, N. Y., and those of the Pennsylvania at Olean, N. Y. With the exception of work done by its yard locomotives at St. Mary's, Pa., all switching on the P. S. & N. is performed by road crews. Mr. Beaver's testimony related to spotting services performed and engine hour costs. Neither of these P. S. & N. witnesses was subjected to any extended cross-examination. At the close of their testimony Examiner Bardwell adjourned the hearing to resume at Detroit, Mich., on October 26.

PORCELAIN INSULATORS recently ordered by the Pennsylvania for the extension of its electric track improvement from Wilmington, Del., southward, aggregate 82 carloads, or about 1,200 tons. These insulators, some of which are made at the Westinghouse shops in Derry, Pa., are made to withstand 132,000 volts.

THE ILLINOIS CENTRAL and the Chicago & Eastern Illinois will reduce the time from Chicago to west coast points in Florida from three to four hours on December 15, when sleeping cars will be operated over the Perry cut-off of the Atlantic Coast Line, instead of running through Jacksonville as at present.

Reduced Barge Rates On Cotton Suspended

(Continued from page 623)

in the past. The rail rate on cotton from Memphis to New Orleans is 75 cents per 100 pounds with carrier's privilege of compression in transit, and 60 cents on compressed cotton.

The suspension was not ordered for any such time as seven months, the statutory period allowed the Interstate Commerce Commission in which to ascertain whether a new railroad rate is fit to become effective, but it was announced that arrangements are being made for a prompt hearing and that "it is the desire of the Acting Secretary of War that a decision should be rendered in time to be effective on this year's movement of cotton."

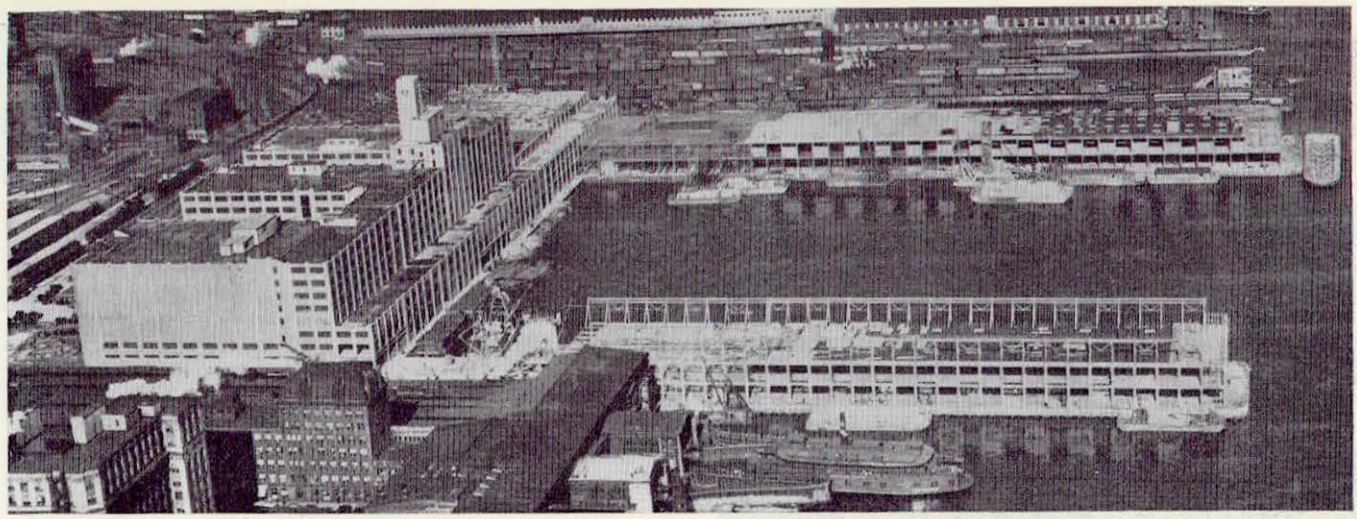
However, the fact that the rate was suspended at all represents a new experience for the barge line, which in many ways is a law unto itself, even in matters of arithmetic.

What happened between Tuesday and Saturday has not been made a subject of detailed official announcement, beyond the fact that the two railroad executives were at the White House, but queries by New Orleans and other newspaper men finally elicited a statement about noon Saturday based on information furnished by General Ashburn. The Acting Secretary of War was out of town on Saturday and it is understood that the suspension was ordered on Friday. The statement referred to a hearing at Chicago at which were present many prominent railroad men, the chairman, his assistants and legal advisor, and that "it was understood at this time that the decision announced by the chairman was unsatisfactory to these railroad men and that they would protest." It was also stated that "this viewpoint of the railroads was laid before the Acting Secretary of War by the chairman of the board", after he had announced his decision, "with a statement that probably there would be many protests against the rates." The statement continued:

> The protests of the railroad representatives were based on the ground that the proposed reduction in rates would mean serious loss of revenue to all cotton-carrying roads in the South, both East and West of the Mississippi, not only to New Orleans, but to New England, the Southeast and the Carolinas, and would aggregate certainly several million dollars, and might lead to the disruption of established methods of marketing cotton which they felt would have a serious effect on the interior cities and towns of the Mississippi Valley.
>
> After considering the above contentions, and carefully going into the reasons advanced by the chairman for the promulgation of these rates, the Acting Secretary of War decided to follow as nearly as feasible the practice of the Interstate Commerce Commission and suspend the rates until a hearing of all parties concerned could be held on the ground. Of course definite commitments which have been made by the Inland Waterways Corporation with its patrons prior to the suspension, and after the promulgation of the rate, will be carried out, but no new commitments will be made during the suspension. Arrangements are being made for a prompt hearing, and it is the desire of the Acting Secretary of War that a decision should be rendered in time to be effective on this year's movement of cotton.

The rate of $1 a bale is considerably less than the rate which would be produced by the usual 20 per cent differential under all-rail rates but the railroad men told Chairman Brainerd that as they understood the barge line's argument it was that it was desirous of meeting the competition of railroads that had reduced

(Continued on page 633)



An Air View of the New Rail-to-Keel Terminal Just Before Its Completion

Modern Rail-to-Keel Terminal Built at New York Harbor

New development, including two piers and over 1 1-2 million square feet of warehouse and cold storage space, added to Pennsylvania's water front facilities

THE Pennsylvania railroad, in conjunction with the Pennsylvania Dock and Warehouse Company, has completed at Jersey City, N. J., in the New York harbor, what is said to be the largest, most modern, and, in many respects, the most unusual water-front freight terminal in the country, combining under continuous cover approximately 2,371,000 sq. ft. of floor area in piers, warehouses, and a cold storage plant, for the handling of every class of local, domestic and export freight and produce. The new terminal, which cost in the neighborhood of $17,000,000, consists essentially of two modern, double-deck steamship piers, served by railroad tracks, directly connected to a three-unit, eight-story warehouse, which is also served by tracks. One of the warehouse units, with 280,000 sq. ft. of storage space, is used almost exclusively for cold storage purposes, while in the other two units, 1,335,000 sq. ft. of floor space is provided for general storage, manufacturing, assembly and display purposes. In addition, about 65,000 sq. ft. of floor area in the three units is set aside for offices and stores.

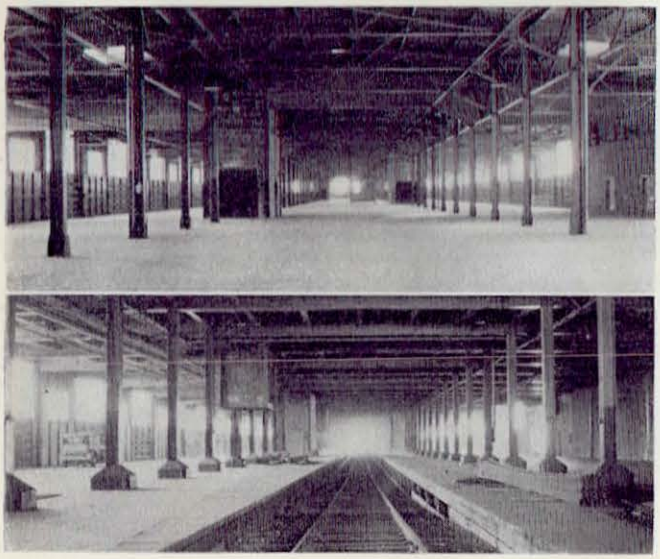
Terminal Has Favorable Location

The new terminal, which is called the Pennsylvania Rail-to-Keel terminal, covers about 8½ acres directly on the North River front, adjacent to the north side of the Pennsylvania's Exchange Place ferry and rail terminal, and directly across the river from lower New York. To secure this site necessitated the removal of a large number of old facilities, including two ferry slips, three transfer bridges and four piers, and the rebuilding of certain of these facilities on a new site further north. In addition, it was necessary to remove or rearrange approximately 5½ miles of tracks, and to set the waterfront bulkhead back about 200 ft. in order to provide for longer piers.

In the new construction work, which was started in July, 1929, the Pennsylvania built the two new piers, while the warehouse and cold storage units were built by the Pennsylvania Dock and Warehouse Company on land leased from the railroad. The three warehouse units, which have a continuous frontage of 970 ft. on the waterfront, lie entirely back of the new bulkhead line. One of the new piers, called Pier F, extends out from the warehouse at its north end, while the other pier, which is called Pier D, extends out from the warehouse at its south end. Between these piers there is a clear opening of 695 ft., providing ample space for bulkhead docking, and for an intermediate pier to be built at a future date.

Details of New Pier Construction

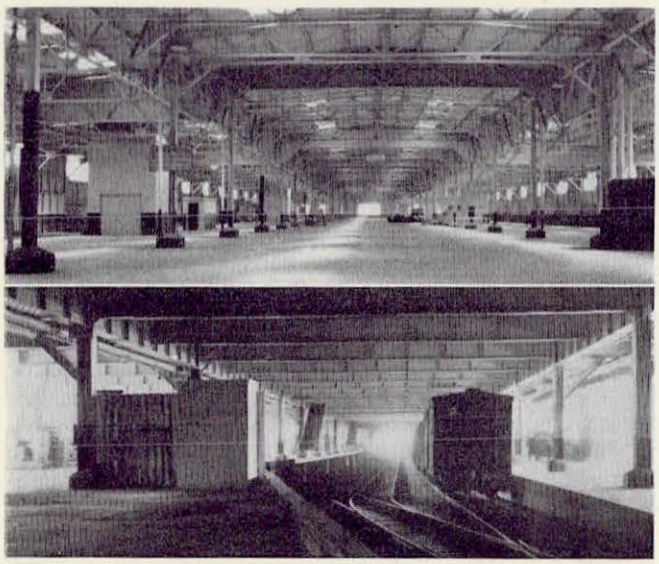
The new piers, which are double-deck, are slightly different in size but are more or less similar in design and construction. Pier F is 160 ft. wide by 915 ft. long, while Pier D is 125 ft. wide by 845 ft. long, plus an extension of 40 ft. on the inshore end, along the south side. In both cases, the upper decks are equipped for handling passengers and freight to and from ships, while the lower decks are designed especially for heavy freight-handling operations. Pier F is served by three depressed tracks, which extend longitudinally throughout its length, while Pier D is served by only one track at the present time. Space has been provided in Pier D, however, for an additional track, which can be easily installed when service demands require.



The Upper and Lower Decks of Pier D Showing Arrangement and Type of Construction

The sheds on both piers are steel frame structures enclosed with Robertson asbestos-protected metal siding, ample areas of Fenestra and Lupton steel sash, glazed with hammered wire glass, and numerous Truscon steel pier doors. The doors are of the horizontal bi-folding type, operated by chain hoist mechanisms, and the upper panel in each case is glazed with a large section of wire glass to increase day-lighting within the piers. In Pier D, the doors are located in every second bay throughout both decks, while in Pier F, they are located in every second bay on the upper deck, and in every bay on the lower deck.

The roofs of both piers are of board construction, covered with Barrett five-ply, slag-coated, built-up roofing, supported on light structural steel roof trusses, which, in turn, rest on four longitudinal rows of columns. The roof-supporting columns in Pier D are spaced 20 ft. center to center in the rows, while in the case of Pier F, the columns in the two interior rows are spaced 40 ft. center to center. This same column arrangement exists on the first decks of the piers, the wider spacing of the columns in Pier F being primarily to minimize obstructions in the floor area.

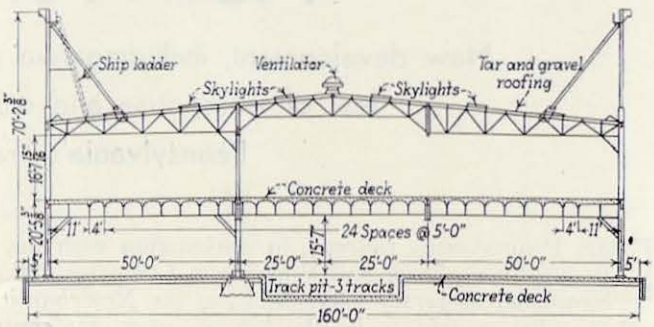


Upper and Lower Decks of Pier F Showing Type of Construction and Adequate Daylighting Provided

All of the pier decks are of concrete construction, the lower decks being of slab construction designed for a loading of 500 lb. per sq. ft. The upper decks of the piers are designed for a loading of 350 lb. per sq. ft., that of Pier D being a flat slab, while that of Pier F is a series of jack arches. In all cases, the decks have been provided with a hardened wearing course, those in Pier D having a Master Builders surface, while those in Pier F were treated with a liquid hardener.

Special Lower Deck Supports Used

The foundations for both piers consist of timber piles, which carry concrete column footings and low transverse concrete walls to support the lower trucking decks. In this construction, piles up to 85 ft. in length were driven in double rows crosswise of the pier, spaced 10 ft. center to center, and alternate bents were provided with additional piles grouped together to carry the column loads. All of the piles were cut off 18 in. above mean low water and capped with 12-in. by 12-in. timbers. Directly over these caps in the different transverse bents, heavy wooden decks, about 3 ft. wide, were provided, which were made to carry the transverse concrete walls supporting the deck slab. In order to guard against too great rigidity in the pier decks and possible damage from the impact of boats, the continuity of the deck-supporting walls across the piers was broken through the centers of the piers at the depressed pier tracks, and the deck slabs were divided into sections and poured after the transverse walls had become set. Through the gap in the deck-supporting walls, the tracks are carried on reinforced concrete slabs resting directly on the pile caps. The columns were given support on concrete pedestals, entirely independent of the deck supports.



Typical Cross-Section of Pier F

Trucking on both decks of the piers is by hand and electric storage battery trucks and trailers, but the amount of trucking necessary is minimized considerably by the fact that commercial motor trucks are permitted on the lower decks of both piers for direct loading and unloading. To facilitate the transfer of freight and cargo from one deck to the other, four Otis electric elevators of five tons capacity each are provided in Pier D, and five such elevators, in addition to another with a capacity of 15 tons, are provided in Pier F. Also, numerous package chutes extend from the second deck of each pier to the lower deck to speed up the handling of smaller units of boxed or crated freight and to relieve the demand on the elevators. To facilitate the transfer of cargo to and from ships, both piers are equipped on both sides throughout their lengths with cargo beams, 28 ft. above their roofs.

Warehouse Built in Three Units

The new three-unit warehouse, which has a frontage of 970 ft. on the river and a depth of 320 ft., consists

essentially of a continuous section, 100 ft. deep, facing the river, and three wings extending back 220 ft. from the rear of this section, which are separated by open courts, 105 ft. wide. In the division of the warehouse into three units for construction and operating purposes, Unit 1, which is at the south end, includes 212 ft. of the warehouse front and the most southerly wing, which is 160 ft. wide. Unit 2 includes 405 ft. of warehouse front and the center wing, which is 300 ft. wide, and Unit 3 consists of the most northerly 353 ft. of the warehouse front and the north wing, which is also 300 ft. wide. All of the units are eight stories high, and, in addition, Units 2 and 3 are provided with four-story towers, the tops of which enclose steel water supply tanks connected directly to the dry-pipe sprinkler system with which all three units of the warehouse and both piers are equipped.

Unit 1 is given over almost entirely for cold storage purposes, while Units 2 and 3 provide space for dry storage, manufacturing, assembly work, display areas, offices and stores. Most of the office space is confined to the river front of the three units, while most of the store space is found on the second floor, which is at the same level as the upper decks of the two freight and passenger piers. However, the entire floor area within the dry storage units is such that a wide degree of flexibility is possible in assigning space.

Roadways Directly Through Warehouse

The main trucking entrance to the warehouse units is from Washington street, a main north and south thoroughfare just west of the building, from which a concrete driveway, 60 ft. wide, extends directly to the rear of Unit 1. At this point, the driveway joins a 40-ft. concrete roadway, which extends along the full length of the rear of the warehouse, connecting with paved areas in the courts between the different units and joining a 40-ft. roadway along the north end of Unit 3. At the front of the warehouse the roadway turns south and continues directly through the building from its north end to its south end, with an outlet at the south end to Washington street and also over the lower deck of Pier D to the trucking concourse of the Exchange Place rail and ferry terminal and to Exchange Place itself. In addition to this circuitous drive, trucking driveways connect the paved courts with the roadway through the building, providing great flexibility in trucking operations. The loading and unloading of trucks at the ground floor level is done in the courts between the different units, where rolling steel doors are provided in each building panel, and also at certain points directly off from the roadway through the building, where similar doors have been installed.

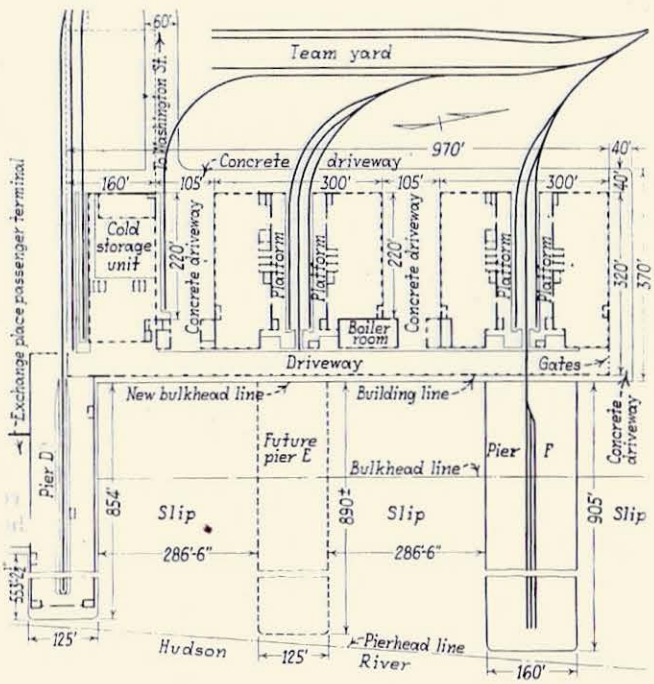
Trucking on the second floor of the warehouse, through which the upper decks of the piers are reached, is over a wide driveway that extends the full length of the warehouse, directly over the 40-ft. roadway on the ground floor. This upper drive, which separates traffic in opposite directions by means of a center curb, is provided with pedestrian walkways along both sides. Access to the drive for trucks, and for taxicabs and private automobiles discharging or calling for steamship passengers, is through the south side of Unit 1 over a concrete ramp which connects with the low-level drive from Washington street.

Within the building proper, the second floor drive connects directly with the piers on its east side, and flanks store and display areas, as well as the public lobbies of the different office and storage units on its west side. All persons using the facilities of the warehouse, as well as all steamship passengers arriving by rail or ferry, enter the terminal from the passenger concourse of the Exchange Place station, which has direct connection with the upper deck of Pier D. Continuing over Pier D, access is had directly with the second floor of the warehouse units and the upper deck of Pier F.

Adequate Rail Service Provided

Rail service to the warehouse is provided over seven stub tracks, exclusive of the single-track leads through Units 1 and 3 to the pier tracks. Of these seven service tracks, two extend under the south side of Unit 1, a third track serves the north side of this same unit in the court between Units 1 and 2, and two tracks extend beneath and serve both Units 2 and 3. In addition to these present facilities, future plans provide for two additional tracks to serve each of the latter units from the court between them. Along all of the tracks, rolling steel doors in the building provide for the transfer of shipments directly between cars and the different building units.

Supplementing rail and trucking facilities, the bulk-



A General Layout Plan of the New Rail-to-Keel Terminal

head space at the head of the wide slip between the two piers affords means for the direct transfer of freight between the warehouse units and lighters or other types of water craft, entirely independent of operations on the piers. Even if an intermediate pier is constructed between Piers D and F at some later date, as is contemplated, about 570 ft. of docking space will still be available along the face of the warehouse.

Special facilities in the warehouse include 9 passenger elevators and 14 eight-ton freight elevators, with provision for four more freight elevators when conditions warrant. The special facilities also include a restaurant, a hospital unit, a machine and carpenter shop, a power plant for supplying heat to the building and parts of the piers, and the refrigerating equipment of the cold storage unit.

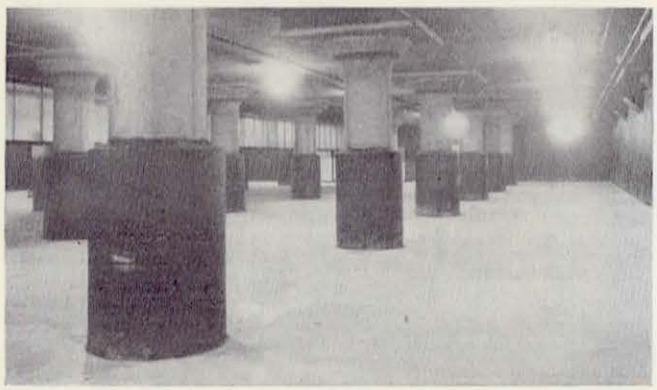
Details of Warehouse Construction

The warehouse units are entirely of reinforced concrete construction with the single exception of the supporting structure for the second-floor driveway

through the building, spanning the 40-ft. roadway on the first floor, where structural steel girders, beams and columns were resorted to. All of the floors above the first are of two-way flat-slab construction, designed for loadings varying from 250 lb. to 150 lb. per sq. ft., the lighter allowable loading being adopted for the higher floors. The floors throughout the dry storage units have a hardened cement finish, which was poured monolithic with the structural slabs, while those in the cold storage unit are insulated with cork.

All exterior concrete columns and lintel beams are exposed, while the walls between columns are made up of red face brick with terra cotta backing, and large panels of Truscon steel sash. The roof over the entire warehouse is of flat-slab construction, surfaced with built-up roofing.

The foundations of the building consist of concrete piles poured within steel shells, which were driven 25 ft. to 40 ft. below mean low water to rock. Many obstructions were encountered in the driving of the steel shells, including old timbers, boulders and rock cribs, but, owing to the rigidity of the pipe shells used, it was usually possible to go through or to displace the ob-



A Typical View Into One of the Well Insulated Rooms of the Cold Storage Unit

structions without the pipe going out of line. In some cases, however, it was necessary to excavate through the obstructions and construct concrete caissons. A typical footing consists of four or five 18-in. piles in a cluster, capped with concrete and a steel billet.

The concrete floor slab of the ground floor has support on an earth fill, but to insure its stability in the event of displacement of the fill by high water or wash, it was heavily reinforced so as to be self-sustaining under a loading of 300 lb. per sq. ft. The roadway through the building at the ground level, beneath which there is no fill, is supported on heavy concrete girders and beams, doubly reinforced to withstand both the superimposed loads to which it will be subjected and the more or less indeterminate stresses caused by the tying up of lighters or floats along the bulkhead. Specifications called for the use of 2,000-lb. concrete in all beams and slabs, and 2,500-lb. concrete in all columns.

Cold Storage Unit is Fully Insulated

To make Unit 1 suitable for cold storage purposes, with cooler, freezer and sharp freezer service, it was necessary to incorporate a number of special construction features of interest. This unit is similar in construction to the other units, except for extra reinforcing in the columns and outside floor panels, provided to take care of the additional stresses to which these members are subject by reason of sudden and wide temperature changes, and for the complete insulation of all areas devoted to refrigerating purposes. Another feature of interest is the fact that the floors have direct contact with the side walls, instead of being separated by insulation as in the envelope type of construction which has been employed in a number of modern cold storage plants.

Most of the ground floor, which is occupied principally by refrigerating machinery and receiving and shipping space, is uninsulated. The second, third, fourth and fifth floors are insulated for cooler service and are provided with coil capacity sufficient to obtain temperatures down to plus 20 deg. F., while the sixth, seventh and eighth floors are insulated for freezer service and are equipped to maintain temperatures down to minus 20 deg. F.

The insulation throughout the plant consists of 6 in., 7 in. and 8 in. of compressed corkboard, applied in two layers, with broken joints both horizontally and vertically, and completely sealed and waterproofed with asphalt compounds. In insulating the exterior walls, the first layer of cork was applied with cementing asphalt to a scratch coat of cement plaster applied directly to the hollow tile backing of the face brick and primed with emulsified asphalt. The second layer of corkboard was attached to the first layer with cork cementing asphalt and hardwood skewers, following which the exposed face of corkboard was primed with liquid emulsified asphalt and then coated with two applications of a special emulsified asphalt applied with a trowel.

The main interior walls were insulated much the same as the exterior walls, but simple partition walls separating refrigerating rooms were constructed with two layers of corkboard separated by a core of cement plaster. Insulation of the floors was likewise similar to that provided on the side walls, except that the two layers of cork were cemented together with waterproofing asphalt and a water-proofing course was applied over the top layer. The actual wearing surface of the floors consists of a three-inch layer of concrete, reinforced with wire mesh.

Special Features of Insulation

To prevent the transfer of temperature through the building columns from one floor to another, the bases of all columns, to a height of about five feet, are insulated with two layers of cork, and similarly, to prevent the transfer of temperature through the floor connections with the side walls, and through the floors from room to room, two-course bands of cork, from six feet to eight feet wide, were applied around the border of each room, fixed to the under side of the floor slabs. In applying these bands, the first layer was used as a lining in the floor slab forms, while the second layer was applied to the first with cork-cementing asphalt.

The concrete slab roof over the plant was insulated with two layers of cork, as in the case of the floors, held together by waterproofing asphalt. The top layer of cork was then covered with a five-ply built-up roof coating.

All of the cork insulation, which amounted to approximately 3,000,000 board feet, was furnished by the Cork Insulation Company, Inc., New York, while all of the asphalt materials used in the application of the insulation, which amounted to 24,000 gal. of liquid material and 127 tons of plastic material, was furnished by the Lewis Asphalt Engineering Corporation, New York. Brine circulation is used exclusively for refrigerating purposes and the entire plant is equipped with the Moore system of ventilation and humidity control.

The various facilities at the new terminal are oper-

ated by several companies, including the Pennsylvania Dock & Warehouse Company, New York, which operates Units 2 and 3; the General Cold Storage Companies, New York, which operate the cold storage unit; and the Export Steamship Company and the Scantic Line, which are utilizing the new piers under arrangement with the Pennsylvania railroad.

Construction of the piers was carried out under the direction of A. C. Watson, chief engineer of the New York zone of the Pennsylvania, and under the direct supervision at various times, of Messrs. L. P. Struble, J. J. Vail and F. C. Richardson. The work on Pier F was done under contract by J. Rich Steers, Inc., New York, while that on Pier D was done under contract by the Terminal Warehouses, Inc., and the F. H. McGraw Company, both of New York. These latter companies also constructed the warehouse and cold storage units.

Reduced Barge Rates On Cotton Suspended

(*Continued from page 628*)

rates to meet truck competition and that 20 cents a hundred was about equal to the division it had been receiving out of joint rail-barge rates on cotton. The proposed barge rate was to be available on cotton taken to the barge line in trucks but it is not quite clear when the count of 2,000 bales was to begin.

Indications that the protests of the railroads are likely to bring about a rather thorough airing of the rate-making policies of the federal barge line, including the effect of its rates on the traffic and revenues of the railroads, were seen in a further announcement from the War Department on October 20 that the Acting Secretary of War had directed an investigation of the new cotton rate and a hearing to be held on October 22 at Memphis at which evidence would be received from all those affected by or interested in the proposed rate. Nuel D. Belnap was appointed as a representative of the Secretary of War for the purpose of holding the hearing and it was stated that he would present to the Secretary a report confined to finding of facts.

A statement as to the character of the evidence particularly desired at such hearing, which was also given, was taken as especially interesting in view of the President's connection with the matter, as he has been one of the foremost advocates of water transportation in general without having said much about government operation of barge lines. Also the incident has arisen at a time when the President is understood to have shown considerable concern about the railroad situation which brought about the rate advance proceeding before the Interstate Commerce Commission, which he is said to have followed closely. One of the facts on which evidence is desired refers to the effect of the barge rates on cotton on the "aggregate transportation costs incurred by the shippers, both direct and indirect", but the language used does not seem to indicate that the incidence of taxes is intended to be included. It was also stated that at the request of the Acting Secretary of War, the Interstate Commerce Commission had granted permission to Examiner G. H. Mattingly, who has been handling cotton rate cases for the commission, to attend the hearing in an advisory capacity.

The commission announced on October 20 a reopening of its cotton rate investigation proceeding for further hearing on the petition of the southwestern railroads for a modification of its order to permit them to make reductions in rates to meet the competition of trucks and unregulated barge lines from points in Arkansas and Louisiana to New Orleans without observing the relation required between rates to New Orleans and those to Mobile. The further hearing will be held before Examiner Mattingly on November 10 and 11.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended October 10 amounted to 763,864 cars, a decrease of only about 14,000 cars under the total for the week before, which was the peak for the year. Also the reduction as compared with the corresponding week of last year was only 190,918 cars, which is less than the spread which has been shown for several weeks. As compared with 1929 the reduction was 415,676 cars, also somewhat less than has been reported in some recent weeks. Loading of livestock showed a slight increase as compared with the week before, although all other commodity classifications showed small declines. The summary, as compiled by the Car Service Division of the American Railway Association follows:

Revenue Freight Car Loading

Week Ended Saturday, October 10, 1931

Districts	1931	1930	1929
Eastern	171,914	213,712	257,593
Allegheny	141,134	188,226	235,237
Pocahontas	50,667	56,109	68,445
Southern	105,698	133,961	161,424
Northwestern	103,022	136,674	176,595
Central Western	124,699	152,745	182,338
Southwestern	66,730	73,355	97,908
Total Western Districts	294,451	362,774	456,841
Total All Roads	763,864	954,782	1,179,540
Commodities			
Grain and Grain Products	36,707	40,571	46,817
Live Stock	28,121	31,319	35,686
Coal	139,783	176,609	208,264
Coke	5,149	9,048	12,250
Forest Products	24,642	39,228	64,723
Ore	23,277	37,017	61,410
Mdse. L.C.L.	217,539	242,634	270,878
Miscellaneous	288,646	378,356	479,512
October 10	763,864	954,782	1,179,540
October 3	777,837	971,255	1,179,947
September 26	738,029	950,663	1,203,139
September 19	742,628	952,561	1,167,395
September 12	667,750	965,813	1,153,274
Cumulative total, 41 weeks	30,107,689	37,079,738	42,279,513

The freight car surplus for the week ended October 7 averaged 544,577 cars, a decrease of 19,707 cars as compared with the preceding week. The total included 288,114 box cars, 196,192 coal cars, 23,498 stock cars and 23,498 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended October 10 totaled 58,158 cars, an increase over the previous week of 2,125 cars but a decrease of 13,093 cars from the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
October 10, 1931	58,158	22,993
October 3, 1931	56,033	22,399
September 26, 1931	50,325	21,724
October 11, 1930	71,251	33,452
Cumulative Totals for Canada		
October 10, 1931	2,000,352	1,052,844
October 11, 1930	2,520,388	1,371,466
October 12, 1929	2,817,239	1,695,325

Rate Rise Application Denied

In decision interlarded with paternal admonition to carriers I.C.C. proposes some increases, to be pooled

By H. F. Lane
Washington Editor, Railway Age

WASHINGTON, D. C.

THE Interstate Commerce Commission has turned its thumbs down on the railroad application for a 15 per cent increase in freight rates.

In one of the comparatively few virtually unanimous decisions it has reached in important cases, dated October 16 and announced on October 20, the commission finds that a 15 per cent increase would "harm rather than help the railroads", and would raise rates on many kinds of traffic above a just and reasonable level; that the "freight business as a whole is doing reasonably well" although offset by the loss in passenger business, and that the railroads themselves are to a considerable extent responsible for their present financial condition and the fact that their credit is at a low ebb.

As a substitute for the railroad plan the commission offers a suggestion designed for temporary emergency relief, proposing specific increases which it estimates would produce between one hundred and one hundred and twenty five million dollars, or between three and four per cent on the basis of present traffic, if applied both state and interstate. This plan is offered for the consideration of the railroad executives "for the purpose of increasing confidence" and with the thought that it may avert more receiverships, if pooled and distributed among roads that most need it to pay interest.

This suggestion for specific increases, excepting a large part of the agricultural products traffic, and with a maximum of 10 per cent on other traffic, is proposed for a limited period expiring March 31, 1933, and conditioned upon the submission and approval of arrangements between the carriers for the pooling of the revenue accruing from the suggested increases so as primarily to enable them to meet their fixed interest payments as they mature.

Later Rate Readjustments Suggested

Other suggestions are made for a careful study and readjustment of rates, including such increases and particularly reductions as may seem likely to produce additional revenues, and the commission promises to expedite such suspension proceedings as are initiated if such tariffs are filed, but the commission recognizes that such a process at best is slow and says that in its judgment it will not fully meet the needs of the present situation. Therefore the temporary increase is offered for the consideration of the railroad executives in the immediate emergency "motived by the thought that the distrust of railroad securities is rapidly gaining such elements of panic that a slight charge on the traffic of the industries of the country best able to stand it may justifiably be imposed, through freight rates, for the purpose of increasing confidence and averting developments which might further disturb an already tremendously shaken financial situation, and to avoid impairment of an adequate system of transportation."

"We do not find," the commission said, "that we are justified on this record to attempt, by a rate increase, to protect the margin of one and one-half times fixed charges set by the New York law. To provide so far as practicable that actual interest charges be met is justified", and it adds that its plan should cover deficiencies in interest on fixed interest obligations with a substantial balance left over. The above estimate does not include increases in revenue which should accrue to the carriers during the coming year from outstanding orders of the commission.

Repeal of Section 15a Again Recommended

Additional suggestions are made as to the railroad future, including more drastic curtailment of passenger service and other economies, but in addition to the many other things which can be done to improve the situation, some of them by Congress, some by state legislatures, some by this commission and the state commissions, and some by the railroads themselves", the report says, "an important step is the repeal of Section 15a and the substitution of a better section designed to accomplish the same general purpose."

Increase to Be Pooled

To obtain the suggested increases the railroads are to submit on or before December 1 a pooling plan which they are to work out themselves in accordance with some general directions, providing that the revenues received from the increases should be earmarked and used only for the purposes provided. Upon such submission and approval the commission promises to grant the necessary authority for filing blanket supplements on short notice and they will be permitted to take effect without suspension, except as to minor details. However, the increases proposed are expected to be accepted as an entirety, without such readjustments as the carriers had expected to make if their blanket application had been granted, and if, for competitive or other reasons, the carriers decrease any of the rates so increased, the amount of the decrease is to be taken from the basic rates rather than from the earmarked increases. The resulting rates will in all respects be subject to investigation and determination as to the lawfulness of particular rates or schedules of rates, as provided by the act.

The particular increases proposed, after excepting some 35 items, such as the most important agricultural products, livestock, logs, wood and ties, include advances of $3 a car on coal, ores, crushed stone, lumber, and products of mines and forests not otherwise specified; $6 a car on such items as phosphate rock, pig iron, stone and petroleum; 1 cent per hundred pounds on citrus and other fruits, melons, products of agriculture not otherwise specified, oils, brick, cement, fertilizers, etc., and 2 cents per hundred on all other commodities, subject to certain restrictions. They are to be superimposed upon the rates now in effect, and also upon

rates prescribed by outstanding orders of the commission not yet in effect, such as the revisions of class rates in eastern and western trunk-line territories for which the roads have just filed tariffs to become effective on December 3.

Commissioner Tate concurred in most of the findings, but dissented from those portions of the report proposing any increases in rates by any amount. Much of the language of the report reads as if written by Commissioner Eastman, although others probably contributed.

Because of the pooling plan required some roads would not receive any benefit from the increases, and some of the bigger coal roads would collect less increased revenue per ton than others because of their larger coal cars. Moreover carriers having obligations already in default or now in receivership, or those deriving less than 50 per cent of their revenue from freight transportation, would neither contribute to nor receive from the fund created, but would be allowed to retain the revenue from the increased rates.

Revenue Needs Not Controlling

Although agreeing in part with the contentions of the carriers as to the meaning and purpose of Section 15a, on which they had largely based their case, the commission says that revenue needs are not the "paramount and controlling" factor but that other factors entering into the determination of reasonableness are still relevant, such as the value of the service to the shipper, the volume of business carried on by the carriers and its relation to what may be deemed normal, and the return realized from the freight service alone, as distinguished from other forms of service rendered by the carriers. In the latter connection attention is called to the close similarity between the figure of $450,000,000 by which it says the passenger service fails to contribute its proportion toward taxes and return on railroad property annually and the amount of money which the carriers estimated they would realize from a 15 per cent rate increase.

Admitting that the railroads have at no time earned 5.75 per cent on the commissions "best estimate of the fair value of aggregate carrier property", the commission says it is also true that since it prescribed that percentage interest rates have fallen and that it is "also persuaded that the recapture provisions of Section 15a had a tendency to depress aggregate net earnings by unduly stimulating the expenditures of the more prosperous carriers." It also says that research into the aggregate earnings of typical private industries indicate that the average earnings of the railroad industry have been better than those of some of these private industries and not much less favorable than those of others."

An abstract of the report follows:

Section 15a

Briefly stated, it is the position of the carriers that section 15a changes our duty to prescribe just and reasonable rates by introducing in the law a new standard for our guidance.

Because of the provisions of section 15a, it is contended that rates, otherwise reasonable, perforce become unreasonably low if the general schedule of rates, of which they are a part, produces revenues which in the aggregate fail to attain the results contemplated by the section. It is urged that the section is superimposed upon the power to prescribe just and reasonable rates in such a way that if the effect of the exercise of that power is to bring the revenues above or below the statutory level, adjustments of earnings to that level must be made by us through other changes in rates. The words "as nearly as may be" in paragraph (2), according to this view, introduce no discretionary factor, but merely cover the mathematical impossibility of attaining the prescribed standard precisely.

Up to a certain point we do not differ with the carriers' interpretation of the law. We agree that our duty with respect to fixing just and reasonable rates was changed by Congress in the act of 1920, through the provision of a modified standard for our guidance. We agree that there was then introduced into the law a new element of protection for the carriers in the public interest, a protection particularly of the credit essential to the preservation of an adequate national system of transportation. We believe that it is our duty under the Congressional mandate to exercise our powers in every reasonable and practicable way to the promotion of that end. We agree, as we did in 1920, that in such a general rate proceeding as this, involving primarily revenue considerations, we can not undertake to consider the justness and reasonableness of individual rates.

But there is more than this to be said, if our full duty is to be made clear. In *Reduced Rates 1922*, 68 I. C. C. 676, 730, we said, in considering section 15a, "Our function under the law is not that of mere computers and can not thus be atrophied." Assuming that the paramount purpose of that section is the provision of adequate revenue for the carriers, it is the *actual revenue result* of a proposed increase in rates which we must have in mind, and not the effect apparent superficially. We understand that in principle the carriers do not dispute this proposition, although they may differ as to how conclusions upon this point are to be reached. Our own view is that we are not justified in approving a rate increase if we are convinced that such increase will not operate to the revenue advantage of the carriers.

We agree with the carriers that prior to section 15a the revenue needs which we were bound to consider were those of individual carriers, although as a practical matter we have long considered all competing lines and not merely that line which can handle the business cheapest in determining the reasonableness of rates. *Receivers and Shippers Asso.* v. *C., N. O. & T. P. Ry. Co.*, 18 I. C. C. 440. Thereafter the standard was changed by Congress so that now we are bound to consider instead the revenue needs of the carriers in the aggregate or by groups, and such needs were brought into the foreground and emphasized. In every reasonable and practicable way we must recognize those needs and protect the general credit of the carriers.

But section 15a has not, in our opinion, made revenue needs the "paramount and controlling" factor in the determination of a reasonable general level of rates. Factors which theretofore were relevant and entitled to consideration, notwithstanding the revenue needs of individual carriers, are still relevant and entitled to consideration, notwithstanding the revenue needs of the carriers in the aggregate or by groups.

Discussion and Conclusions on 15 Per Cent Increase

In this discussion we shall deal first with the railroad credit situation, dividing it into two periods, one from 1920 to 1929, inclusive, and the other from 1930 to the present time.

The first of these periods, considering the carriers in the aggregate, was characterized in general by continual improvement in carrier credit. It was a period of rapid expansion in railroad plant and facilities. Corporate surplus increased from $3,142,416,871 to $5,529,010,053, a total of $2,386,593,182, or about 76 per cent. The amount of stock yielding dividends increased from $5,075,039,642 to $7,506,264,973; the average rate on dividend-yielding stock, from 6.52 to 7.47 per cent; and the average dividend on all stock, from 3.74 to 5.70 per cent.

It is true that at no time did the aggregate net railway operating income equal 5.75 per cent on our best estimate of the fair value of aggregate carrier property; and much has been made of this fact by the carriers and security holders. But without wholly disparaging the importance of this fact, it is also true that after 1922, when we found 5.75 per cent to be a fair average return, the general trend of interest rates was downward, and that at no time following the 10 per cent reduction in rates in that year did the carriers seek a horizontal increase in rates, except in the western district. There a 5 per cent increase was sought and denied, but with the suggestion to the carriers that they should analyze their traffic and initiate increases on particular commodities in lieu of a horizontal increase on all traffic. We are also persuaded that the recapture provisions of section 15a had a tendency to depress aggregate net earnings by unduly stimulating the expenditures of the more prosperous carriers.

The point has been made that the carriers during the period of prosperity were prevented by public regulation from enjoying the large profits which accrued to private unregulated industries. Aside from the fact that in the period 1920 to 1929, the carriers increased their total corporate surplus by over two billions of dollars and at the same time were able to increase dividend payments materially, the evidence indicates

that a misleading impression is created by the fact that railroad earnings are stated in the aggregate, including all railroads both good and bad, those which were improvidently constructed with inadequate public need and those which constitute the essential arteries of commerce.

Reference has also been made to the dwindling ton-mile revenue of the railroads, and this is ascribed to public regulation. From 1890, when the figure was 0.941 cents per ton-mile, the tendency was steadily downward until 1899, when 0.724 was reached. Then it was slightly upward to 1904, when the figure was 0.780. Again the tendency turned downward until a low point of 0.719 cents was reached in 1916. Thereafter, the figure rose sharply during the War period and the immediately ensuing years, with our approval, to meet the greatly increased expense of operation, attaining a maximum of 1.294 cents in 1921. In 1922, the 10 per cent reduction occurred, but its full effect was not felt until 1923, when the figure became 1.132 cents. Thereafter it fell slowly, reaching 1.088 cents in 1929, or a drop of a little less than 4 per cent since 1923. However, in the same period freight operating expense per revenue ton-mile fell from 0.869 to 0.729 cents, or a drop of about 16.1 per cent. Net railway operating income from freight per net ton-mile increased from 1.918 mills in 1923 to 2.765 mills in 1929, a gain of a little more than 44 per cent, whereas net railway operating income from passengers per passenger-train car-mile decreased from 4.697 cents in 1923 to a deficit of 0.586 cents in 1929. It is plain that it has been the passenger rather than the freight business which has been a drain on net earnings.

Revenue per ton-mile is not a precise index of the general freight rate level, because of the varying length of average haul and composition of traffic. Assuming it to be nearly correct, it does not follow that the drop in this figure since 1923 is due to public regulation, although this may in part be the case. We have reduced various rates and increased others. However, it is well known that the railroads have themselves voluntarily reduced many rates for competitive and commercial reasons. The nonferrous metals are outstanding examples, the rates on which the carriers have reduced for one cause or another to such an extent that, in general, the increase which we granted in 1920 has been wholly eliminated together with a substantial part of the increase made by the Director General of Railroads during the period of federal control. Other illustrations in the case of transcontinental traffic, lumber, petroleum and its products, cotton, and numerous other commodities are familiar.

Traffic and earnings fell sharply in 1930, but without immediate substantial effect on railroad credit. The market for railroad bonds continued good. In the first six months of 1931 bonds with a par value of $319,209,000 were marketed and $38,209,000 of equipment obligations. Counsel for the savings banks and insurance companies stated in argument that credit was relatively good in the first three months of this year.

The abrupt decline in railroad credit, therefore, is a very recent event, but that there has been such a decline, more particularly in the case of overlying and refunding bonds, has been clearly shown. Even if the showing made by the committees representing the security holders be discounted somewhat, the situation is still ominous. That it reflects a present loss of confidence in and distrust of the railroad securities available for marketing purposes, as a reliable and stable investment, can not be gainsaid, and if this distrust is prolonged for any considerable period of time the results are likely to be very serious, both in their immediate effect on the railroads themselves and in their indirect effect upon the financial situation generally.

We are not unmindful of the needs of the carriers as to proper maintenance. The combined maintenance of equipment, way and structures in the first six months of 1931 was $192,000,000, or 20.8 per cent, lower than that in the similar period in 1930. The maintenance expenditures in the first half of 1931, were, therefore, below the average of the years 1924-1929 to the extent of 34 per cent, which on annual basis would be approximately $705,000,000.

The decline in credit has been due primarily to the shrinkage in railroad earnings caused by loss of traffic, a falling off, roughly speaking, from about 1,000,000 carloadings per week to about 700,000, to say nothing of the equally serious loss in passenger traffic. That this decline is due chiefly and predominantly to the business depression we have no doubt. There are few now living and active who have had experience with a depression at all like the present one. It has been forgotten that in such depressions the railroads always suffer very severely. The industries which suffer most severely are those which produce largely capital equipment, such as the iron and steel industry; next comes the railroads; then the industries which produce primarily consumers' goods; and the public utilities suffer least of all. On the other hand the reaction, as prosperity returns, is in reverse order. But in this instance the distrust in railroad securities inspired by the effects of depression has been much accentuated by the rather sudden awakening to the fact that the railroads are now faced by serious competition from other, largely new, and developing means of transportation. And it has been further intensified by the widespread publicity which the railroads and the holders of their securities have deemed necessary in the pursuit of restrictive and regulatory legislation for the other forms of transportation and the proposed rate increase. The final result is that the situation now has in it the element of panic.

This overshadowing pessimism, like the optimism of 1928, is undue, and will be corrected in the natural course of events. But in the meantime it is a fact which must be reckoned with. The question is whether a 15 per cent increase in freight rates is an effective reasonable, and lawful way to meet the situation. It is not inappropriate to say that we approach this question with a background of experience with railroad rates, and the conditions under which they are made and can be maintained.

The carriers draw a parallel between the present situation and that which existed in 1920 when a general increase in rates was authorized. Conditions then prevailing were radically different from those which exist today. In 1920 business was prosperous and commodity prices were relatively higher than railroad rates. Shippers were crying for good service and quite willing to pay the price of higher rates. There was no contention that an increase would curtail traffic. In addition the railroads were in unprecedented need of new capital.

While the credit of the railroads is at a low ebb, it is also true that for the present and some time in the future the needs for new capital are not likely to be of commanding importance.

In some respects the situation in 1922, when rates were reduced 10 per cent, is more nearly parallel with that now existing. The country was then in a state of business depression and traffic had fallen off.

Commodity prices generally, and particularly the prices of farm products, are very materially below the pre-war level and there is no upward tendency, whereas railroad freight rates are much above a pre-war level and the proposed 15 per cent increase would place them, broadly speaking, at a pinnacle in railroad history. It follows irresistibly that freight rates, even now, constitute a greater relative burden upon industry than ever before, and at a time when industry has gravely impaired stamina to sustain the burden. There is diligent search for means of saving every cent possible in expense of distribution.

That there are important opportunities for such saving which already have been utilized in substantial degree the record amply shows. Waterway competition is not a new thing with the railroads, but it was greatly stimulated by the opening of the Panama Canal. Besides the Panama Canal traffic, there is important waterway competition along the Atlantic coast and Gulf, on the Great Lakes, on the Mississippi and Ohio rivers, and on the Hudson River and New York barge canal. Import traffic brought by water from foreign countries to our ports often menaces domestic movements, as in the case of wood pulp, petroleum, nonferrous metals, cement, coal, sugar, and iron ore.

Movement by truck is a new form of competition which has been developing with great rapidity. It has been principally effective on less-than-carload traffic, and relatively short hauls of such commodities as livestock, cotton, cement, sand and gravel, gasoline, fruits and vegetables, and general merchandise; but it is continually extending to more and more traffic, and for longer distances, as trucks and trailers are enlarged and highways improved. The carriers introduced evidence to show that it would be feasible for the trucks to divert only a comparatively small amount of additional tonnage, even if rates were increased. But without exaggerating the menace of this form of competition, we are convinced that the carriers have underrated it, and that its possibilities are materially greater than they are prepared to concede.

For a long time transportation of crude oil by pipe line has exerted a controlling force on many railroad rates on both crude oil and gasoline. To this competition has now been added pipe lines for the extensive transportation of gasoline and natural gas. In addition, so far as coal is concerned, movement by rail has been substantially curtailed by the construction of central power plants, both water power and steam.

Nor are these competitive means of transportation by any

means the only factors tending to lessen traffic which must be considered in connection with a relatively high level of freight rates. The evidence before us amply shows that the tendency of such a level is to localize industry and also impel the use of substitute products. That such a tendency in industry is rapidly developing the evidence before us plainly indicates. And there is a similar tendency to use, where available, substitute products which require less transportation in their distribution. This is particularly true of lumber and coal, but it affects other industries as well.

Dangers of a Rate Increase

However sympathetic one may be with the plight of the railroads and their need for additional revenue, such sympathy cannot with benefit to any one be carried to the point of a refusal to recognize and face facts. The facts set forth above show beyond question that there are elements of plain peril to the railroads in such an increase in freight rates as they propose at the present time. The chief dangers are (1) that at a time when transportation costs are of vital consequence to every industry it will simulate new competitive forces already rapidly developing (2) that it will alienate or impair the friendly feeling toward the railroads on the part of the people of the country which is essential to adequate legislation for their protection and the proper regulation of all forms of transportation in the public interest, and (3) that it will disturb business conditions and an already shell-shocked industry, and accelerate the tendency toward a localization of production.

We have often referred to the fact that we are not managers of the railroads and have taken the position that we ought not to interfere with those who are entrusted with management on matters which are not controlled by law but must be determined in the last analysis by wise administrative policy and judgment. That is still our view. But here reliance upon the judgment of the executives as to the revenue effect of an increase in rates is much weakened by their failure to adduce any substantial reasons for their judgment and the definite withholding of the best available information on this point in their possession, namely, the information of their traffic departments. The excuse that this would have prolonged the hearings unduly is not, in our judgment, an adequate answer.

On the other hand we have a mass of definite and concrete evidence from the shippers on this point of revenue effect which stands in the record uncontradicted by anything other than general assertions. Five of our members heard this evidence, although none heard it all, and they had the opportunity of appraising the character and sincerity of the witnesses. In our opinion this evidence is entitled to great weight.

We also have a mass of definite and concrete evidence from shippers in regard to the general industrial collapse and the condition of individual industries. This evidence also stands uncontradicted and, as has already been indicated, it shows beyond dispute that the situation of the railroads with respect to earnings is paralleled throughout the industrial world, and that many particular industries are in much worse plight. This is especially true of agriculture, and preeminently true of the grain farmer. The present prostration of a large part of agriculture has seldom if ever been equalled in the history of the country.

Upon the evidence, therefore, it is our conclusion that a 15 per cent increase in all freight rates and charges would increase revenues, if at all, only temporarily and that its ultimate effect, not very long postponed, would be to harm rather than help the railroads. It is similarly our conclusion that such an increase would raise the rates upon many kinds of traffic above a just and reasonable level. This latter conclusion applies particularly to the products of agriculture, including livestock. We are advised that the committee representing the co-operating state commissions has reached the same conclusions.

It does not follow, however, from the conclusions above set forth that no increase in rates should be made at this time. As a result of investigations extending over many months we have prescribed, effective December 3, 1931, maximum reasonable rates on class traffic in official and western trunk-line territories and between those territories whose net effect we believe will be a substantial increase in revenue, unless diversions to trucks attain unanticipated proportions. We have also prescribed maximum reasonable rates throughout the country on furniture, effective February 25, 1932, which may produce increased revenue, although the danger of diversion to trucks is greater in the case of furniture than in the case of class traffic taken as a whole. We have also prescribed maximum reasonable rates on livestock in the western district, effective January 25, 1932, which should increase the revenue from this traffic in western trunk-line territory, where the revenues of the railroads have been particularly low. A similar revision, in general upward and effective December 3, 1931, has been prescribed in the case of petroleum and petroleum products.

In addition to these pending revisions and others which are in progress on our docket, we believe that the traffic departments of the railroads should address themselves to the task of making such changes in the rates on particular kinds of traffic as will, in their judgment after careful analysis of all attendant circumstances, produce additional revenue and which can be supported as reasonable under existing conditions. This does not necessarily mean increases in rates. It is quite likely that there are now many rates which will produce more revenue if they are reduced, and we include in this category rates which we have prescribed as maxima.

If tariffs are filed, in accordance with this suggestion, proposing changes in rates upon particular movements or kinds of traffic we shall be guided, in determining whether they shall be suspended, not only by the statements filed in support and protest, but also, in part, by our own general knowledge and the record in this proceeding as bearing on the particular kind of traffic in question. It should be noted that the protests which we are here considering do not go to every form of traffic. And to the extent that suspension proceedings are initiated, we shall expedite their disposition.

But at best a process of rate readjustment of the kind above described is slow, and in our judgment it will not fully meet the needs of the present situation. The further step which we are now about to propose is offered for the consideration of the railroad executives in the immediate emergency, and only as a temporary measure of relief.

The Substitute Plan

This plan is outlined in the appendix. It is designed to avoid imposing burdens on industry which can not reasonably be borne under present conditions, to limit the danger of diversion of traffic to other forms of transportation, and to disturb business conditions as little as possible by preserving, very generally, existing rate relations. Therefore certain commodities have been excluded from any increases and the increase has been tempered on others. The basis has been made as definite as possible in order to minimize disputes, and as simple as possible in order that the increased rates may be made effective speedily. The increase is in cents per 100 pounds or amounts per car, subject to a fixed percentage maximum limit. Except for very short hauls affected by this maximum, it is in uniform amounts, so far as particular kinds of traffic are concerned. The abnormal conditions now existing distinguished the situation from that before us *Increased Rates, 1920, supra,* wherein we discussed the respective merits of percentage and flat increases. We propose to limit the increase to a period ending March 31, 1933. Its continuation after that time will depend upon conditions then existing.

As has been shown, the carriers and holders of their securities stress the credit situation. As a whole, earnings are inadequate, yet the earnings of certain of the carriers are ample to support their credit. The securities of even such carriers suffer from the distress of others not so fortunate. The increases which we propose would, without further provision for the allocation of the resulting revenue, to a certain degree help the carriers now in need, but would go, in part, to carriers now securing revenues adequate to sustain their credit, and as to which no emergency exists. They would not afford aid in maintaining an adequate transportation system for the country in proportion to the burden imposed on the public.

The advisability of pooling the earnings resulting from any increase granted has been discussed of record. The standing of railroad obligations and the consequent credit of the carriers even those enjoying adequate earnings, will be improved if a plan can be devised which will give reasonable assurance that fixed interest obligations, not now in default, can be protected generally from default.

The applicants apparently recognize that at this time it is futile to increase rates with the object of reaching 5.75 per cent on the value of their properties as a whole. The practical limitation of what the traffic will bear and continue to move by rail must be given consideration. Clearly any practicable increase, unaccompanied by a pooling provision, might not prevent threatened default in the fixed interest obligations of some of the carriers. On the other hand, a smaller increase in the aggregate revenue, marshalled for the benefit of the carriers in need, will tend to stabilize the industry. We shall provide for such marshalling.

Many difficulties will have to be met in working out the

details of a plan and for the distribution of that fund in the first instance among the carriers who fail to earn their interest charges, in proportion to their deficiencies. We are convinced that these difficulties can be met. A plan to that end should be worked out by the carriers and submitted for our approval. In such a plan appropriate provision will have to be made to take care of variations in maintenance, depreciation and other operating charges. Perhaps the depreciation and maintenance charges of the year immediately preceding the time of computation should be prescribed as the maxima of those accounts in determining deficiencies in earnings. Appropriate provisions should be made as to the accounts of carriers reporting separately but operated as part of a system. Other similar adjustments may be necessary.

The applicants should set up the machinery for operating and should operate the plan. At the end of six months or other appropriate interval, any balance remaining in the fund so created should be distributed to the carriers in the proportions in which earnings accruing on their properties have contributed to it.

The Railroad Future

It is not enough to deal merely with the 15 per cent increase proposed and our substitute form of temporary relief. Something should be said of the railroad future and what can be done in a more enduring way to protect and stabilize it. The railroads now furnish the backbone and most of the other vital bones of the transportation system of the country, and we believe this will be the situation for a long time to come. We are not impressed with the thought that they are doomed, in anything like the near future, to go the way of the stage coach and canal.

The most effective remedy for the immediate ills of the railroads is the economic recovery of the country. The present low earnings are not the result of low rates but reflect general industrial conditions. When railroad earnings take a sharp turn upward, as in due time they will, railroad credit will also rise.

An important step is the repeal of section 15a and the substitution of a better section designed to accomplish the same general purpose. We recommended such legislation last year in a special report to Congress and shall renew the recommendation in our annual report this year. The present recapture provisions hang like a cloud over the credit of many companies when times are bad. The problem presented by the varying earnings of different railroads can better be met in other ways, such as consolidations, pooling arrangements, and the adjustment of divisions.

Nor do we believe that the present provisions of paragraph (2) are desirable in all respects. They cherish elusive hopes that by mere changes in rates railroad earnings can be made stable regardless of economic conditions. In our special report to Congress we suggested a substitute for this paragraph which we believe will better serve the end desired. (See *Railway Age*, January 31, 1931, page 271).

We believe that this substitute emphasizes the public need for maintaining railroad credit quite as strongly as does the present paragraph. It will be noted, also, that it contains recognition of the principle that inasmuch as railroad earnings must inevitably fall below normal in times of depression they may properly be permitted to rise above normal in times of prosperity. Such recognition might well be supplemented by a provision that some portion of surplus accumulations shall be held in liquid form. Present experience shows that no matter how large such accumulations may be, (and they have been large in the case of the railroads during the past decade), they may be of comparatively little use in meeting immediate deficiencies in earnings, if they are invested in railroad property, as they normally are. So invested, they can be converted into cash to replenish the treasury only by the issue of securities, and these cannot be issued when credit is impaired.

Congress and the state legislatures should also, we believe, direct their attention to the proper regulation in the public interest of all competitive forms of transportation. In this we include such restrictions on the size and weight of trucks and their lading as public safety may dictate, such taxation of trucks and busses as may be necessary to impose upon them a fair share of the burden of the public highways which they use, such supervision of trucks and bus common carrier lines as may be necessary to avoid destructive and wasteful competition, and such regulation of their rates and service as the public interest may require.

What we have said as to the trucks and busses applies also to the waterways. It is strongly urged by the rail carriers that the water carriers are not bearing their fair share of the burden of the waterways, constructed or improved at public expense, on which they operate. Here again the facts are controversial and must be ascertained. But the contention of the rail lines presents a matter for unbiased investigation, which may be in need of correction if fair competitive conditions are to prevail. The same may be said of the public regulation of the port-to-port rates of common carriers by water, which are now subject to no effective regulation.

The so-called car-forwarding companies present a situation in the transportation field which calls for public regulation, as we pointed out and recommended in our last annual report. Here there seems no difference of opinion on the point. It is not unlikely that the service performed by these companies can, with profit to the railroads and advantage to the country, be made a definite part of railroad service.

The railroads, as cities expand and public highways multiply in number and use, have been and are being called upon to invest great amounts of capital in alterations of their properties which are often, from a strictly railroad point of view, very largely nonproductive. The burden of these expenditures must be borne by the public in one way or another, but the question arises whether this burden is being apportioned fairly. To the extent that it is caused by other than railroad needs and does not increase the traffic of the railroads or save them expense, it may be that this burden should justly be shifted from the shoulders of railroad users.

Railroad managements face new conditions which compel changes in methods of operation, manner of service, and price policies. It is a situation which frequently confronts private, competitive industries, and they have become accustomed to such readjustments by force of necessity.

The Passenger Deficit

Foremost among the problems to be solved is that presented by the passenger service. Broadly speaking, this service for the country as a whole fails by something like $450,000,000 annually to contributing its proportionate share toward taxes and return on railroad property. The close similarity of this figure to the amount of money which the carriers estimated that they would realize from the 15 per cent increase, if no loss of traffic resulted, is striking. In other words, if the carriers were able to conduct the passenger business as profitably as the freight business, they would even now, under adversity in a period of great depression, be earning enough to stabilize their credit situation. The freight business as a whole is doing reasonably well, present conditions considered. The carriers in this record pointed out the substantial curtailments of passenger service which have been made in an endeavor to reduce losses. They have also undertaken experimental service in the hope of recovering profitable patronage. But much more drastic measures will be necessary if the staggering deficit incurred by that service is to be reduced to bearable proportions. On some lines it may be necessary for the companies to retire from the passenger business entirely. On others it may be that better service with lighter trains at greater speed and at lower fares will revive patronage and reduce expense.

So far as freight service is concerned, the railroads have so many and so great inherent advantages of economy, particularly in the case of the longer hauls and the heavier traffic, that we cannot believe that they will not be able to withstand the competition of the motor trucks. To meet this situation effectively, however, it is evident that radical changes in service and rates must be made.

The new competitive conditions make it necessary, also, for the railroads to cooperate more efficiently with each other and reduce the waste, both in service and in rates, which has marked their own competition.

The record shows that in the past decade the railroads have made great strides in improving their service and at the same time operating with greater efficiency and economy. But what they have done in this direction has largely followed lines which developed under conditions different from those which now prevail, and it has been characterized by a continual intensifying of their own competition. At a time when as an industry they have new enemies to face, their warfare with each other has grown more bitter, so that economies in operation have been offset in part by the growth of competitive waste.

All this is contrary to the spirit of the Transportation Act, 1920. Congress then looked beyond the individual railroad to the concept of a national transportation system. It pointed the way in the consolidation provisions to the reduction of competitive wastes. It went to the extreme of removing the barriers of restrictive federal and state anti-trust legislation which might otherwise stand in the way. Short of consolidations, it opened wide the door to agreements for the pooling of service and of revenue, whenever it could be shown to our satisfaction that such agreements were in the public interest. Much has been accomplished in the way of unification, but much remains to be done, and the pooling provisions of the law stand almost

unused. Further progress along the lines pointed out by Congress will aid in bringing about the cooperation which is essential to railroad salvation. But the problem can not wholly be solved in this way, nor is there need that cooperation should be subordinated to the consolidation program.

In the meantime we have under way an investigation, Ex Parte No. 104, into such railroad practices as may adversely affect net earnings, and we shall pursue this inquiry with diligence.

The committees representing the security holders have suggested the formation of a special commission to consider the needs of the railroad situation. Such procedure has been followed in England, and it is receiving consideration in Canada, whose problems are very like our own. We have no authority to constitute such a commission and are, therefore, not in a position to follow up this suggestion.

Appendix—Plan for Increasing Freight Rates

In the tables which follow, the generic descriptions of commodities or commodity groups are those specified in the order of the Commission, Division 4, of November 22, 1927, *In the Matter of Freight Commodity Statistics.* They cover the specific items customarily included by the carriers in their reports to the Commission under each numbered description.

The plan is that on commodities included under the following numbered descriptions there shall be *no increase:*

No.	Description	No.	Description
10	Wheat.	124	Grapes, fresh.
20	Corn.	125	Peaches, fresh.
30	Oats.	127	Fruits, fresh, domestic, n. o. s.
40	Barley and rye.	130	Potatoes, other than sweet.
41	Rice.	150	Beans and peas, dried.
42	Grain, n o. s.	162	Flaxseed.
50	Flour, wheat.	163	Sugar beets.
51	Meal, corn.	170	Horses, mules, ponies, and asses.
52	Flour and meal, edible, n. o. s.	180	Cattle and calves, single-deck.
61	Mill Products, n. o. s.	181	Calves, double-deck.
70	Hay and alfalfa.	190	Sheep and goats, single-deck.
71	Straw.	191	Sheep and goats, double-deck.
90	Cotton in bales.	200	Hogs, single-deck.
91	Cotton linters, noils, and regins.	201	Hogs, double-deck.
100	Cottonseed.	400	Logs.
120	Apples, fresh.	402	Wood (fuel).
122	Berries, fresh.	410	Ties, railroad.
		443	Excelsior (wood) and sawdust.

On commodities included under the following numbered descriptions there may be an increase of *$3.00 per car:*

No.	Description	No.	Description
200	Anthracite coal.	392	Products of mines, n. o. s.
300	Bituminous coal.	401	Posts, poles, and piling.
310	Coke.	420	Pulp wood.
320	Iron ore.	430	Lumber, shingles and lath.
330	Copper ore and concentrates.	431	Box, crate, and cooperage materials.
331	Lead ore and concentrates.	432	Veneer and built-up wood.
332	Zinc ore and concentrates.	443	Products of forests, n. o. s., except excelsior, (wood) and sawdust.
333	Ores and concentrates, n. o. s.	692	Furnace slag.
350	Gravel and sand (other than glass or moulding).		
351	Stone, broken, ground, or crushed.		

On commodities included under the following numbered descriptions there may be an increase of *$6.00 per car:*

No.	Description	No.	Description
390	Phosphate rock, crude (ground or not ground).	352	Stone, rough, n. o. s.
391	Sulphur (brimstone).	353	Stone, finished, n. o. s.
490	Iron, pig.	360	Petroleum, crude.
693	Scrap iron and scrap steel.	370	Asphalt (natural, by-product, or petroleum).
		552	Artificial stone, n. o. s.

On commodities included under the following numbered descriptions there may be an increase of *1 cent per 100 pounds:*

No.	Description	No.	Description
101	Cottonseed meal and cake.	440	Rosin.
110	Oranges and grapefruit.	441	Turpentine.
111	Lemons, limes, and citrus fruits, n. o. s.	450	Petroleum, oils, refined, and all other gasolines.
123	Cantaloupes and melons, n. o. s.	451	Fuel, road, and petroleum residual oils, n. o. s.
126	Watermelons	452	Lubricating oils and greases.
140	Cabbage.	453	Petroleum products, n. o. s.
141	Onions.	540	Cement, natural or Portland (building).
142	Tomatoes.	550	Brick, common.
143	Vegetables, fresh, n. o. s.	551	Brick, n. o. s., and building tile.
151	Fruits, dried or evaporated.	560	Lime, common (quick or slacked).
152	Vegetables, dried, n. o. s.	630	Ice.
160	Vegetable-oil cake and meal, except cottonseed.	640	Fertilizers, n. o. s.
161	Peanuts.		
164	Products of agriculture, n. o. s.		

On all other commodities, including all less-than-carload freight, there may be an increase of *2 cents per 100 pounds.*

The increases set forth above are subject to the following provisos:

1. In no event shall the increase levied on any carload be in excess of 10 per cent of the carload charges which would be assessed in the absence of the increase.

2. In the case of less-than-carload freight, no increase shall be assessed for hauls for which the applicable or corresponding class rates are assessed on a basis of not more than 175 miles, and the increase for hauls over 175 miles and not more than 250 miles computed in like manner shall be 1 cent per 100 pounds.

3. Where rates are stated in schedules in dollars per car and the increase, as shown above, is an amount per 100 pounds, the increase shall be $7.50 per car if such amount per 100 pounds is 1 cent, and $10.00 per car if such amount is 2 cents.

4. In the case of rates on petroleum products and on furniture, covered by the orders in No. 17000, Parts 4, 4A, and 5, they shall not, on and after the dates when the rates covered by such respective orders become effective, exceed the maximum rates therein prescribed.

All switching charges may be increased 10 per cent, subject to the exception that in the case of the Chicago switching district (Illinois-Indiana) the charges, on and after the date when the rates covered by the order in No. 19610 become effective shall not exceed the maxima therein prescribed.

It is not intended to increase the proportions of joint through rates to or from points in foreign countries accruing for the transportation in such foreign countries; the proportions of such rates accruing within the United States may be increased to the extent herein approved for domestic rates.

BOAT LINES

The increases herein suggested may in like manner be applied to rates of the boat lines subject to the Act.

It is the intention to authorize but one increase on any particular through shipment, however the total rate is constructed or ascertained.

If the adoption of the different rates of increase herein suggested results in any violation of the aggregate-of-intermediates or long-and-short-haul provision of section 4 (1) of the Act, the carriers should take prompt steps to remove the violation or promptly make applications for relief.

Some General Aspects of the Decision

While the commission showed unusual expedition in handling this case and in rendering a decision in four months from the date of the application the result seems to be that the commission has "passed the buck" back to the railroads with hardly more than a gesture so far as rate levels are concerned. However, while the commission's advice relegates the railroad executives to the position in which they were at the time of their meeting in Chicago in May, when they decided to initiate studies looking to a rate readjustment consisting of both increases and reductions—a program which was later discarded in favor of a proposal without exceptions—it is doubtless somewhat better than the 10 per cent general reduction ordered by the commission at the time of the last depression in 1922. On the other hand that reduction was accompanied by a considerable reduction in wages ordered by the Railway Labor Board to become effective on the same day. In this report the commission says not a word about wages, although it is generally believed that the most important thing it decided was that there would be initiated a campaign for a reduction of the wages covered by contracts following those that have been generally made in salaries and wages of employees not covered by union contracts. On this basis the report was regarded in some quarters as constructive.

The issuance of the report was well timed to give the railroad executives plenty of topics for discussion at their meeting in Atlantic City to begin on Wednesday, including a bristling problem in the ethics and merits of co-operation. After reading the railroads an emphatic warning against the dangers of a general rate increase and its tendency to kill off traffic, the commission has given the stronger railroads of the country an opportunity to incur those risks, although on a smaller scale not exceeding 10 per cent, without hope of compensating benefits to themselves, in an effort to collect revenue for the most needy roads in a currency which the commission, at least, has just described in effect as stage money. In other words, some of the things the commission said about the effect of a 15 per cent increase when advocated by the railroads do not apply to a 10 per cent increase for the "Communistic Chest." On the other hand the roads would be given some chance to show that traffic can stand some increase even at such a time.

The railroads' 15 per cent proposal, it was well understood, contemplated a great many reductions later to meet competition of other forms of transportation, while placing greater dependence on their back-log of traffic not likely to escape them. They are now given an opportunity to collect a surcharge on most of their traffic and, even if they should reduce some of their rates, the top one cent, two cents or $3 or $6 of each rate is to be turned over to some one else, even if, as indicated by the commission, it has already had a tendency to reduce the traffic which would otherwise have been enjoyed. Undoubtedly the stronger roads would be placed in a difficult position before the public if they declined to join in this gesture of co-operation, but ap-

(Continued on page 648)

Motor Transport Section

Co-ordinated Rail and Truck Service*

The features necessary to attract shippers, and the various means of providing them

By Russell W. Talbot

Strathcona Memorial Fellow in Transportation, Yale University

THE requirements of a co-ordinated rail and motor truck transportation system for intercity service may be stated by summarizing the analyses of the reasons why shippers use trucks. Some of these requirements must be regarded as absolutely essential and others as highly desirable, so a differentiation will be made in enumerating the requirements.

1. Essential Factors:
   a. Overnight service from the shipper's plant to the consignee's store door.
      This through service must be performed between the hours of 6:00 p.m. and 7:00 a.m. the next morning, the time limits corresponding to the plant closing time and the store-door opening time, respectively.
   b. A total cost to the shipper not above the prevailing trucking rates.
      The rates of the more substantial trucking companies are fairly uniform. A trucking association has been formed by the larger trucking companies in the area studied to protect the truckers from the destructive effects of a competitive rate war, by standardizing rates. At present it is felt that the association controls the rates of the more reliable truckers, and it is claimed that its influence and membership are growing.
      The co-ordinated service rate schedule should provide both a "container load" and a less-than-"container load" schedule of rates, similar to the present practice of the railroads and trucking companies.
2. Desirable Factors:
   a. Shipment from the plant to the consignee's store door on one through rate.
      The shipper should be billed at one rate for the entire movement and should deal with one transportation company only.
   b. Elimination of rehandling en route.
      Regardless of the size of container adopted by a co-ordinated service, there will always be the necessity of moving some less-than-"container load" shipments. These shipments will have to be consolidated at the receiving end into an economical container load and sorted out at the delivery end for local distribution. Thus, in actual practice, rehandling of shipments of small size can never be eliminated.
   c. The ability to provide non-scheduled expedited service for rush shipments.
      This involves operating small trucks over the road direct from plant to consignee's store door at any time required by the shippers. This operation must be superimposed on any co-ordinated rail-truck service.
   d. The establishment of a special organization for the purpose of integrating the rail and truck operation of the co-ordinated system.
      To be successful, a co-ordinated system must satisfactorily solve the shipping problems of industry and at the same time adhere to the requirements imposed by railroad operation.
   e. Co-ordinated service provided by the railroads in conjunction with the more substantial trucking companies.
      The local pick-up and delivery should be performed by these truckers and the long haul by rail. These substantial trucking companies have well-established trade connections of which use should be made. Also, they are familiar with the special delivery requirements of certain industries.

What Kind of Container?

The basis of any co-ordinated system of rail and motor truck transportation must be some form of container or vehicle which can be transported equally well by rail or by motor, and which can readily be transferred from one agency to the other. Consequently, the problem resolves into the design or adaptation of some container or vehicle which can be used to provide the requisite service to shippers.

Certain co-ordinated rail-truck services are now in operation on some of the interurban electric railways in the Middle West. It is possible to adapt to steam railroad practice the essential features of two of these services; namely, the Railwagon Service of the Lake Shore Electric and the Truck-body Container Service of the Cincinnati & Lake Erie.

The railwagon service hauls semi-trailers on flat cars, and the truck-body container service hauls truck bodies. However, the operating practices of these two services are essentially the same. The container unit, whether semi-trailer or truck body, is hauled on special flat cars between rail terminals in the two cities being served. The truckers perform the terminal pick-up and delivery of these container units. Shipments of "container load" size move without rehandling en route directly from consignor to consignee, the container being sealed before leaving the shipper's plant. Less-than-"container load" shipments are consolidated and distributed in the usual manner by freight forwarding companies, making use of either railwagon or truck-body service. The rail haul is performed during the night so as to provide early morning store-door delivery.

Overnight service, with early morning delivery, from

* The third and last excerpt from a survey entitled "The Shipping Situation between New York City and Philadelphia," privately printed for the Committee on Transportation, Yale University. The first excerpt appeared in the *Railway Age* of September 26, and the second in that of October 10.

the shipper's plant to the consignee's store door is being given by the co-ordinated rail-truck services now in operation on the interurban railways in the Middle West, many of which operate between cities more than one hundred miles apart. Such systems are able to provide this service because of the flexibility of terminal operation with motor trucks, the rapid interchange of the container unit between the motor and rail carrier, and the high schedule speed of the rail carrier in the long haul between the terminal areas. It is felt that the adaptation of such systems to steam railroad practice can furnish service between cities located 250 miles apart or less during the time limits set by the requirements—6 p.m. to 7 a.m. In this extreme case the terminal movements by motor truck in each city would have to be performed in about two hours each, leaving nine hours for the 250-mile rail haul, which can be provided by fast freight service. A proportionately greater amount of time would be available for rail and truck movements in operation between cities nearer together.

Competitive Rates Can be Met

It has been demonstrated by these rail-truck systems that such co-ordinated service can be profitably rendered to the shipper at lower rates than equivalent service by motor trucks or l.c.l. rail shipment. It is on this competitive cost basis that the rail-truck systems are successful.

The railwagon service on the Lake Shore Electric between Cleveland and Toledo provides a rate for 8,000 lb. of any merchandise, that is equal to Rule 26 of the rail class-rate schedule applying between these two points. For 20,000 lb. which is the capacity loading of a single container unit, the rate is equal to the rail fifth-class rate.

Most commodities moving by rail in l.c.l. lots are in a higher class than either Rule 26 or fifth class. In addition, the cost of local cartage at both ends of the rail haul should be included in comparing shipping costs. Motor trucking rates on the whole are generally as high as the corresponding l.c.l. class rates. Therefore, it is reasonable to assume that these co-ordinated systems will be able to offer cheaper rates to shippers for corresponding services than either motor truck or l.c.l. rail transportation.

A recent investigation made by the Pennsylvania between Philadelphia and New York indicates that such co-ordinated service adapted to steam railroad operation will furnish lower through rates to shippers than the existing forms of transportation.

The shipment from plant to store door on one through rate is a practice which fits in well with co-ordinated rail-truck service. The rail carrier may establish the rate schedule for this through service and do business directly with the shippers, in which case the carrier must provide for the terminal trucking in one of two ways. It may enter the trucking business and operate its own fleet of trucks in each of the cities being served, or it may contract with local trucking companies to perform such service for it. The latter is the practice on the Lake Shore Electric. The other alternative is for a trucking company to establish the through rate schedule and deal with the shippers. In this case the rail carrier bills the trucking company for hauling the containers between the two cities being served, under a tariff filed to cover such operation. This is the practice on the service routed via the Cincinnati and Lake Erie.

The elimination of rehandling en route is a natural consequence of co-ordinated rail-truck service for shipments of "container load" size. Less-than-"container load" shipments must be handled in the usual manner by consolidation at the receiving end and by distribution at the delivery end. Rehandling in connection with such shipments cannot be eliminated.

Non-scheduled expedited service for rush shipments can be provided only by operating small trucks over the road at any time of day desired by the shippers and not as a part of the regular co-ordinated rail-truck service, which must be operated on schedule.

The "Railwagon" System

The railwagon system in operation on the Lake Shore Electric between Cleveland, Ohio, and Toledo, has the possibilities of being successfully adapted to steam railroad practice to serve as a basis for co-ordinating rail and motor truck transportation. A railwagon is a specially constructed highway semi-trailer that can be drawn over the city streets or highways and that also can be carried over the railroad. In the latter operation the railwagons are carried on a special railroad flat car with the wheels hanging over the sides of the car. A railwagon is substantially a container unit fixed on a chassis equipped with "single" rear wheels and solid tires. The wagon weighs about 9,000 lb., and it is 18 ft. long by 8 ft. wide. The rated carrying capacity has been fixed at 20,000 lb. The over-all dimensions of the railwagon car conform to those of the box car. The distance of the railwagon wheels above the track is greater than the corresponding distances of the journal boxes, so there is no danger of these wheels hitting obstructions on the track.

Some of these railwagons should be provided with a door or opening at the sides or top, in addition to those with doors at the end, in order to meet the loading requirements of various shippers. These units are equipped with the standard coupling device at present used on most trailers. They may be hauled in "trains" from the shippers' plants to the railhead, or as single trailer units. Generally, the number of trailers which may be hauled by a tractor is restricted by city ordinances.

The coupling device on the tractor and the "dolly" under the rear railwagon are standard highway equipment. Many cartage and motor highway companies now operate tractors that can handle railwagons without any change in their existing equipment.

The loading ramp, located at the railhead, automatically transfers the railwagons from the highway to the flat car and vice versa. It is a simple affair of substantial construction without moving parts. It consists of a platform designed to accommodate a number of railwagons and a lead-off rampway located on the rail end. The tractor brings the railwagons to the railhead at any time of day and deposits them on the platform of the ramp. It is not necessary for the tractor or driver to be present when the railwagons are being loaded upon or unloaded from the flat cars.

The flat car equipment is of all-steel construction and is specially designed to carry three railwagons per car. The journal bearings on this equipment are located inside the wheels instead of outside. The space thus made available is utilized by the wheels of the railwagon which overhang the sides of the car. By this means, the dimensions of these cars loaded with their complement of three railwagons each are kept within the standard A.R.A. clearance limits. The "latch," just above the trucks, is used to couple the railwagons

loosely to the body of the car. The handbrakes are so constructed that they can be readily removed for the loading and unloading operations.

How Railwagons Are Loaded

The first step in the loading operation is to push the flat car or cars under the railwagons standing on the platform of the ramp. When this movement has been completed, the railwagons stand over, and clear of, the deck of the car. They are then coupled loosely to the latter by means of the "latches." These "latches" are swung upward into a horizontal position and engage lugs attached to the underside of each railwagon frame. The car is then drawn forward on the track and pulls the railwagons with it from their original position. They roll along the platform, down the incline, and automatically come to rest in their proper position for the rail haul. In the unloading operation the reverse action takes place. That is, the railwagons climb the incline and rise clear of the car.

The flexibility and simplicity of the loading and unloading process is one of the salient features which renders this system especially adaptable to operation in terminal areas where the volume of traffic to be handled is large. The transfer of the container units between the highway and flat cars is performed by a single switching move without the necessity of handling by crane or derrick.

A special train made up entirely of railwagon cars can be run nightly, if the amount of traffic handled by this system between two cities is large enough to warrant it. If the amount of traffic does not warrant the operation of a special train, these cars can be handled on a scheduled fast freight which runs nightly between the cities involved.

The truck-body container system of co-ordinated transportation, in operation on the Cincinnati & Lake Erie between Cincinnati, Ohio, and Toledo, has the possibility of being readily adapted to steam railroad practice to serve as a basis for co-ordinating rail and motor truck transportation. Its operation is essentially the same as the operation of the railwagon system, except for the difference in methods of handling the container units.

The Truck-Body Container

The truck-body container is an all-steel unit, 17½ ft. long, 8 ft. wide, and 7½ ft. high. As its name implies, it is a portable truck body specially designed in order that it may be readily interchangeable between rail and highway transport. It is provided with doors in the middle of each side, and in appearance it resembles the body of a box car. This unit is hauled over the city streets on a motor truck or trailer chassis, so constructed as to securely hold the unit in place. After these units have been loaded, a seal is placed on each of the four doors before delivery to the railhead.

Each truck-body unit is equipped with four lifting hooks located on the sides of the unit at the top. A gantry crane is installed at the rail terminal over the tracks devoted to rail-truck service. Upon arrival at the terminal, the unit is lifted from the truck chassis by means of the crane and a suitable grappling device which engages the lifting hooks. It is then placed on a specially designed flat car which has previously been spotted under the crane. The flat cars are equipped with anchorage devices for centering and firmly holding the containers. When a container is lowered by the crane on to a flat car, the anchorage devices automatically lock all four doors of the unit so that theft is impossible. Each flat car is built to carry two units.

After every interchange operation performed by the crane between the truck and the flat car, a shifting movement is necessary in order to "spot" a car in the proper position under the craneway for the next operation. This involves "spot" and "pull" movements for each unit handled. It would appear that this operation lacks the speed necessary for a single crane to handle a large amount of traffic in as short a time as would be necessary with overnight delivery between cities two hundred miles apart.

For the service on the Cincinnati & Lake Erie, the Motor Terminals Company of Cincinnati owns the container units and the special gantry cranes located at the railheads. Cargo Transport, Inc., a group of affiliated trucking companies, leases this equipment, transports the containers locally, and deals directly with the shippers. A container is furnished to a company for direct loading, if its shipments warrant it. When the loadings from one shipper are not of "container load" volume, the freight is collected by small trucks and taken to the inland freight terminal where various shipments are consolidated into a container load. The container is then moved on the special truck chassis to the railhead.

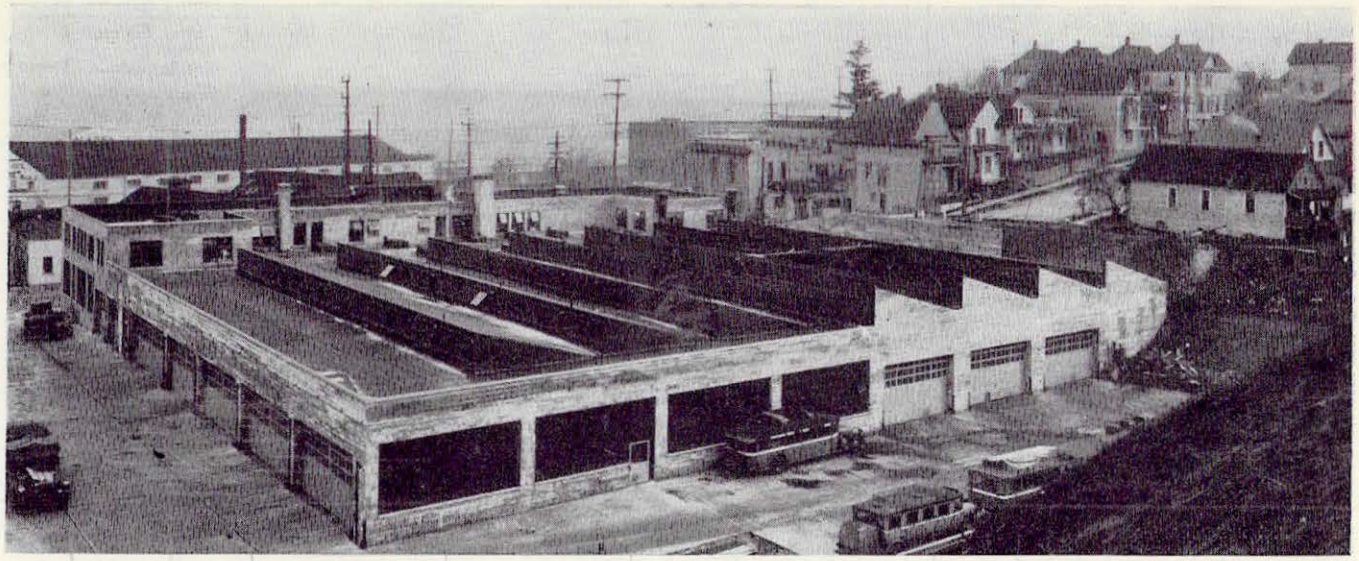
The Cincinnati & Lake Erie carries the containers between the two cities under a minimum tariff of thirty cents per container mile. The railroad is responsible for the terminal expenses of crane operation and switching movements, and for damage to the container or its contents by a wreck or avoidable abuse while the unit is in its custody.

In the adaptation of this operation to steam railroad practice, the railroad itself might well own the containers and cranes and contract with truckers to perform the local cartage for them. In this manner they would be able to deal directly with the shippers on a through-rate basis.

A. C. F. Builds Special Service Truck

THE American Car and Foundry Motors Company, New York, recently built and delivered to the Bee Line, one of the large bus operators on Long Island, a special service truck which is exceptionally complete in its equipment. The truck is equipped to lift 15,000 lb. if necessary, and with its 125 h.p. Hall-Scott engine, is able to obtain a speed of approximately 45 miles an hour. It is also equipped with a line tension indicator for use in conjunction with the power-operated cable hoist. This automatically turns off the engine when the cable reaches a predetermined tension.

Special Service Truck Built by A. C. F. for the Bee Line



The New Pacific Greyhound Garage and Office Building at Portland, Ore.

Reducing Maintenance Costs

Pacific Greyhound Lines find adequate maintenance facilities pay for themselves

IS the relatively high cost of a specially designed and specially constructed motor coach shop and maintenance plant justified from the viewpoint of the large investment involved? The question has been answered in the affirmative by Pacific Greyhound Lines, which recently placed in operation a $200,000 plant in Portland, Ore. Not only is the plant showing a profitable return on the investment on the basis of savings in rentals, but the speeding up of maintenance operations, due to factory production principles and the installation of modern equipment designed for the particular need of motor coach maintenance, has effected considerable economies.

These economies are due, primarily, to the elimination of virtually all outside maintenance labor charges and the speeding up of coach repairs, enabling equipment to be more speedily returned to operation and revenue production. Architects of the building consulted with experienced motor coach maintenance engineers in planning the layout of the shop-floor area, with the result that the "straight line" maintenance system was worked out to provide for washing, servicing, greasing and inspection of coaches in a systematized manner that eliminates almost all lost motion.

The building itself occupies a ground space of 200 ft. by 240 ft., and is built on a plot of land measuring 200 ft. by 294 ft. The building faces public streets on three sides and the additional ground space provides a private street in the rear of the building, measuring 54 ft. in width. The front of the building is two stories in height, the upper floor providing space for administrative and general offices, as well as club quarters for drivers and a kitchen and cafeteria for office and mechanical forces. The second story has a floor area of 9,750 sq. ft.

The first floor, with an area of 48,000 sq. ft., provides space for the following departments: Wash rack, greasing and inspection pits, repair pits, machine shop, service shop, blacksmith shop, paint shop, body shop, two stock rooms, tire rooms, oil and grease room, battery room, electric shop, "lost and found" room, locker room, toilet, shower and wash room, and shop offices. Construction of the building is of reinforced concrete, with steel trusses over the one-story portion. All floors are concrete and the entire floor is treated with a metallic floor hardener to minimize dust and provide a hard wearing surface.

Motor coaches coming in from road duty are run directly on to the wash racks, measuring 36 ft. by 42 ft. and having a capacity of two coaches at one time. Steel balconies run down either side and through the center of the wash racks between the cars. Along these balconies are spray heads so arranged that cars may be thoroughly soaked and surface dust removed before the application of a soap preparation. After washing, the cars are rinsed off with clear water. The entire process is controlled by the manipulation of valves, making the maximum time for a thorough cleaning of the coach about five minutes. The galleries permit ready access to the coach roof. Provision is also made for the removal of grease and accumulated oil on motors by steam or hot water under 300 lb. pressure. Paint removal and chassis cleaning facilities are provided on a separate rack.

Thoroughly washed, coaches are then moved ahead over greasing pits where they are refueled and greased and the oil is changed or replenished. Here batteries are tested and serviced, and tires are inflated to the proper pressure. The grease and oil supply is stored in a separate room and is forced under pressure through pipes to the greasing pits. The oil is measured through

(Continued on page 646)

Operating Statistics of Large Steam Railways—Selected Items for the Month of August, 1931,

Region, road and year	Average miles of road operated	Locomotive-miles: Train-miles	Locomotive-miles: Principal and helper	Locomotive-miles: Light	Car-miles: Loaded (thousands)	Car-miles: Per cent loaded	Ton-miles (thousands): Gross, Excluding locomotives and tenders	Ton-miles (thousands): Net, Revenue and non-revenue	Average number of locomotives on line: Serviceable	Unserviceable	Per cent unserviceable	Stored
New England Region:												
Boston & Albany 1931	402	137,899	144,788	10,220	3,810	66.3	198,806	66,360	81	49	37.7	27
1930	407	146,804	155,870	14,485	4,264	66.5	221,868	78,613	89	36	29.0	34
Boston & Maine 1931	2,066	300,867	343,204	32,542	10,069	69.2	517,533	190,097	176	110	38.5	28
1930	2,066	348,477	395,050	53,686	11,441	69.4	600,689	233,800	246	51	17.3	55
N. Y., New H. & Hart. 1931	2,069	426,287	500,990	28,128	13,221	64.8	713,125	263,316	243	100	29.1	20
1930	2,093	399,035	469,702	27,695	13,855	64.0	769,811	303,182	276	70	20.3	49
Great Lakes Region:												
Delaware & Hudson 1931	876	247,687	316,601	34,239	7,670	60.6	476,868	212,721	242	30	11.0	128
1930	875	302,248	395,058	38,971	10,208	64.8	601,412	279,437	240	32	11.8	108
Del., Lack. & Western 1931	998	384,812	426,257	48,231	12,667	67.2	701,511	276,050	211	60	22.0	42
1930	998	448,172	497,272	58,239	15,024	65.7	876,030	361,781	232	54	18.8	37
Erie (inc. Chi. & Erie) 1931	2,316	727,173	756,886	57,549	31,321	60.2	1,941,857	710,609	389	109	21.9	108
1930	2,316	826,515	886,150	66,755	37,092	61.2	2,268,835	873,325	391	90	18.8	85
Grand Trunk Western 1931	1,021	215,541	217,304	1,443	5,185	60.0	308,403	108,545	113	37	24.7	37
1930	1,020	235,451	238,379	4,592	6,572	63.1	378,302	137,762	120	30	20.0	43
Lehigh Valley 1931	1,343	419,244	441,176	37,298	12,523	63.4	755,702	307,468	218	153	41.2	47
1930	1,343	457,697	492,236	49,145	15,227	65.4	922,848	403,612	256	91	26.2	51
Michigan Central 1931	1,869	391,917	392,859	9,082	12,302	59.4	719,981	242,065	150	63	29.6	54
1930	1,865	426,458	427,419	14,244	14,252	60.2	834,315	304,690	164	50	23.2	54
New York Central 1931	6,477	1,647,636	1,763,541	104,433	60,602	60.2	3,764,209	1,519,109	840	523	38.4	249
1930	6,468	1,724,712	1,856,630	132,279	67,880	62.0	4,161,621	1,752,375	1,041	319	23.5	422
New York, Chi. & St. L. 1931	1,660	479,153	486,477	1,634	15,102	60.4	891,036	318,559	174	67	27.9	59
1930	1,660	557,147	569,454	7,037	18,199	61.4	1,064,071	389,512	203	61	23.1	54
Pere Marquette 1931	2,200	305,837	354,182	3,258	7,369	59.8	470,516	191,906	149	29	16.1	41
1930	2,201	403,142	406,752	3,636	10,623	61.1	641,777	246,523	170	20	10.7	35
Pitts. & Lake Erie 1931	235	76,201	76,326	1,259	2,874	60.2	241,021	136,178	53	24	30.9	28
1930	232	103,433	104,564	1,448	4,281	61.8	344,625	199,552	61	9	12.9	29
Wabash 1931	2,497	601,835	631,149	10,962	18,829	63.1	1,082,975	368,849	255	152	37.3	63
1930	2,497	669,310	718,986	11,095	21,747	62.8	1,277,633	469,988	294	86	22.7	61
Central Eastern Region:												
Baltimore & Ohio 1931	5,536	1,350,110	1,537,879	165,626	41,821	59.5	2,818,240	1,222,408	881	307	25.8	288
1930	5,541	1,600,070	1,870,395	237,021	53,526	61.6	3,620,330	1,664,096	961	235	19.6	207
Big Four Lines 1931	2,721	622,862	643,196	16,503	19,100	61.1	1,204,667	532,281	274	157	36.4	52
1930	2,712	727,664	754,686	20,355	22,857	61.5	1,482,182	682,169	293	167	36.3	34
Central of New Jersey 1931	692	180,168	198,734	35,630	5,344	55.7	363,683	157,901	125	58	31.7	48
1930	692	245,014	268,651	42,564	7,301	57.2	501,319	231,092	158	30	15.8	22
Chicago & Eastern Ill. 1931	939	190,652	191,314	2,453	4,438	58.5	278,579	107,316	91	69	43.2	38
1930	946	199,883	200,640	3,016	5,549	64.5	333,803	143,168	100	51	33.7	39
Elgin, Joliet & Eastern 1931	447	85,009	87,545	2,208	2,057	59.0	160,463	79,534	82	9	10.2	25
1930	453	122,878	128,360	5,370	3,395	62.9	256,705	132,946	79	15	15.7	16
Long Island 1931	400	46,856	48,892	15,686	490	53.3	35,298	13,038	44	3	7.0	5
1930	400	46,335	49,757	11,511	676	52.0	47,212	17,440	37	11	23.1	4
Pennsylvania System 1931	10,628	3,097,310	3,451,876	333,515	105,162	62.0	6,951,871	3,066,457	2,249	272	10.8	893
1930	10,675	3,449,641	3,896,457	381,669	127,044	63.4	8,415,288	3,871,111	2,431	290	10.7	791
Reading 1931	1,451	470,879	510,526	48,365	12,870	57.3	939,183	429,630	320	75	18.9	88
1930	1,448	559,266	609,176	51,519	15,911	59.2	1,162,455	556,655	312	68	17.8	59
Pocahontas Region:												
Chesapeake & Ohio 1931	3,110	980,555	1,033,152	37,198	39,502	54.8	3,375,625	1,818,741	621	77	11.0	269
1930	3,086	1,146,380	1,221,270	55,329	43,850	56.0	3,653,957	1,975,555	536	104	16.3	106
Norfolk & Western 1931	2,272	662,084	712,974	31,711	24,232	58.3	1,999,380	1,040,289	455	38	7.7	155
1930	2,230	761,748	840,646	42,126	29,267	58.7	2,436,671	1,298,480	458	44	8.8	140
Southern Region:												
Atlantic Coast Line 1931	5,163	499,530	501,452	7,059	9,757	62.3	526,790	183,919	389	87	18.2	106
1930	5,160	526,002	527,611	7,418	12,842	63.9	700,284	263,151	384	73	16.0	120
Central of Georgia 1931	1,900	239,632	240,619	4,922	5,177	64.1	290,722	106,694	107	38	26.5	2
1930	1,900	242,658	243,958	3,538	5,868	68.8	313,539	123,918	122	30	20.1	3
Ill. Cent. (inc. Y. & M. V.) 1931	6,670	1,544,758	1,555,454	26,419	36,000	58.2	2,446,718	932,136	724	181	20.0	58
1930	6,695	1,620,452	1,635,433	29,731	43,308	59.6	2,905,338	1,179,220	710	134	15.9	80
Louisville & Nashville 1931	5,263	1,125,672	1,198,791	32,054	24,695	57.2	1,741,169	804,901	522	178	25.5	133
1930	5,251	1,379,933	1,460,153	42,295	30,699	58.8	2,132,198	1,007,799	578	129	18.2	138
Seaboard Air Line 1931	4,466	458,878	469,009	4,620	10,692	61.7	611,779	220,944	251	31	11.0	60
1930	4,479	462,388	480,230	4,306	11,471	61.6	664,070	250,445	275	29	9.5	37
Southern 1931	6,675	1,179,167	1,194,007	21,432	28,266	65.5	1,526,966	571,325	798	181	18.5	218
1930	6,676	1,304,635	1,328,469	22,668	31,089	63.7	1,756,194	677,546	830	146	15.0	252
Northwestern Region:												
Chi. & North Western 1931	8,459	1,165,083	1,219,422	28,555	29,546	60.8	1,815,120	649,538	676	117	8.7	141
1930	8,459	1,393,363	1,469,723	28,602	35,771	58.8	2,303,820	859,499	755	91	7.4	114
Chi. Gt. Western 1931	1,459	247,795	247,840	19,669	7,717	57.3	492,088	183,714	96	19	16.8	3
1930	1,459	274,086	294,785	21,933	9,086	61.8	532,995	202,405	94	14	12.8	9
Chi., Milw., St. P. & Pac. 1931	11,290	1,389,106	1,484,068	72,776	36,602	59.7	2,325,481	924,677	779	140	15.2	307
1930	11,313	1,598,365	1,705,355	92,145	45,866	60.3	2,932,061	1,222,477	818	125	13.3	246
Chi., St. P., Minn. & Om. 1931	1,714	247,322	271,051	13,024	5,206	62.3	315,856	126,804	152	21	12.3	58
1930	1,724	336,585	375,660	14,811	6,971	63.7	423,844	178,765	149	25	14.6	26
Great Northern 1931	8,366	670,757	677,444	20,604	22,502	60.4	1,487,495	661,708	491	143	22.6	137
1930	8,338	884,006	894,215	36,001	33,421	64.2	2,206,337	1,101,210	466	161	25.7	74
Minn., St. P. & S. St. M. 1931	4,329	357,955	364,011	4,331	8,391	63.7	481,170	198,787	156	53	25.2	21
1930	4,351	453,546	466,617	5,519	13,174	65.7	770,371	354,303	170	51	23.3	21
Northern Pacific 1931	6,458	674,967	710,791	41,785	18,990	62.9	1,137,275	423,874	387	126	24.5	69
1930	6,474	750,513	800,548	51,818	24,209	64.8	1,449,879	603,027	404	113	21.9	39
Oreg.-Wash. R. R. & Nav. 1931	2,218	172,243	179,298	12,429	4,612	68.7	268,666	112,215	117	14	10.5	49
1930	2,246	200,552	213,750	13,561	5,784	67.9	346,486	150,365	117	25	17.5	30
Central Western Region:												
Alton 1931	1,000	219,795	232,117	2,330	5,057	55.7	335,454	118,391	106	29	21.5	20
1930	1,000	271,475	286,991	1,876	6,628	61.1	414,870	163,276	127	19	13.2	23
Atch., Top. & S. Fe (incl. P. & S. F.) 1931	11,546	1,584,026	1,689,304	70,973	47,534	60.5	3,052,581	1,101,571	739	203	21.6	213
1930	11,263	1,712,165	1,836,276	86,252	55,649	62.9	3,403,200	1,196,397	785	154	16.4	215
Chi., Burl. & Quincy 1931	9,257	1,132,417	1,172,389	33,105	33,068	59.6	1,983,757	851,341	573	112	16.3	73
1930	9,275	1,360,828	1,419,578	57,224	43,864	61.6	2,696,988	1,245,736	605	171	22.0	34
Chi., Rock I. & Pacific 1931	7,593	1,077,995	1,112,119	7,357	25,827	60.9	1,626,645	656,882	502	127	20.3	117
1930	7,593	1,274,925	1,322,113	12,647	32,855	62.3	2,037,456	838,534	543	133	19.6	108
Denver & R. G. Wn. 1931	2,557	233,618	254,502	26,430	6,895	61.5	421,857	155,222	232	14	5.7	72
1930	2,562	297,142	331,453	37,095	8,209	58.5	534,359	192,388	207	37	15.0	39
Los Angeles & Salt Lake. 1931	1,241	154,558	168,965	15,739	4,302	66.4	246,594	89,843	98	15	13.2	31
1930	1,220	164,077	179,649	22,351	4,947	66.8	296,302	117,528	111	6	5.5	41
Oregon Short Line 1931	2,532	268,978	278,735	15,893	7,473	63.5	439,507	163,025	172	7	4.0	73
1930	2,539	286,881	295,651	19,330	8,592	62.8	529,359	208,756	169	13	7.3	60
So. Pacific—Pacific Lines. 1931	8,940	1,152,485	1,234,046	129,014	34,982	62.5	2,153,211	741,346	660	276	29.5	208
1930	8,981	1,484,583	1,609,453	195,361	47,577	61.9	2,947,668	1,010,005	731	195	21.1	145
Union Pacific 1931	3,768	924,458	944,539	37,719	34,795	58.5	2,138,120	685,295	401	49	10.9	155
1930	3,765	1,231,383	1,258,740	67,029	43,978	59.2	2,771,818	920,204	407	40	8.9	81
Southwestern Region:												
Gulf, Colo. & S. Fe 1931	1,965	197,575	203,293	4,203	5,158	60.9	340,615	143,142	103	18	14.9	35
1930	1,965	224,919	238,945	6,899	8,024	61.7	538,993	240,876	111	12	10.1	25
Mo.-Kans.-Texas Lines 1931	3,282	357,588	361,110	4,667	9,884	58.0	614,416	227,339	171	57	24.9	83
1930	3,176	392,248	398,682	7,648	12,605	59.0	772,727	304,767	164	75	31.4	64
Missouri Pacific 1931	7,419	1,272,044	1,314,118	38,935	35,299	59.9	2,253,692	871,548	510	90	15.1	168
1930	7,423	1,402,251	1,442,556	38,650	41,277	60.2	2,674,282	1,086,555	547	87	13.7	169
St. Louis-San Francisco. 1931	5,175	669,465	675,842	9,370	15,966	59.8	985,113	378,387	386	82	17.5	105
1930	5,169	742,262	753,537	7,986	19,323	59.4	1,191,097	460,023	363	84	18.8	51
St. Louis Southwestern Lines 1931	1,902	200,741	201,567	3,256	5,135	62.9	298,074	111,153	110	27	19.9	35
1930	1,805	247,647	251,293	3,276	6,586	65.4	374,185	139,786	93	27	22.7	17
Texas & New Orleans 1931	4,686	476,887	478,172	937	10,750	61.5	665,618	255,925	218	103	32.1	43
1930	4,680	610,814	612,902	2,338	15,326	64.0	921,671	361,434	270	46	14.6	70
Texas & Pacific 1931	1,946	288,955	288,955	3,508	7,463	59.3	483,491	178,305	179	60	25.1	27
1930	1,951	378,420	378,420	3,087	10,300	59.3	657,401	247,980	201	39	16.3	47

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Compared with August, 1930, for Roads with Annual Operating Revenues Above $25,000,000

Region, road and year	Average number of freight cars on line: Home	Foreign	Total	Per cent unserviceable	Gross ton-miles per train-hour, excluding locomotives and tenders	Gross ton-miles per train-mile, excluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Locomotive-miles per locomotive-day
New England Region:													
Boston & Albany.....1931	3,634	2,979	6,613	12.6	22,104	1,442	481	17.4	324	28.0	5,328	151	38.5
1930	3,181	3,460	6,641	7.2	20,704	1,511	535	18.4	382	31.1	6,229	148	44.0
Boston & Maine.....1931	11,090	7,699	18,789	11.0	22,036	1,720	632	18.9	326	25.0	2,969	107	42.3
1930	11,335	8,536	19,871	7.2	21,058	1,724	671	20.4	380	26.7	3,650	101	48.7
N. Y., New H. & Hart..1931	19,292	12,066	31,358	15.5	24,154	1,673	618	19.9	271	21.0	4,105	99	49.7
1930	18,253	13,354	31,607	14.1	23,929	1,929	760	21.9	309	22.1	4,672	99	46.4
Great Lakes Region:													
Delaware & Hudson.....1931	11,483	3,586	15,069	3.9	25,363	1,925	859	27.7	455	27.1	7,836	115	41.6
1930	10,038	4,402	14,440	4.2	26,090	1,990	925	27.4	624	35.2	10,299	114	51.5
Del., Lack. & Western..1931	19,104	4,731	23,835	6.8	24,985	1,823	717	21.8	374	25.5	8,921	129	56.5
1930	18,082	5,504	23,586	5.6	25,244	1,955	807	24.1	495	31.3	11,692	126	62.8
Erie (inc. Chi. & Erie)..1931	35,335	13,264	48,599	4.2	38,834	2,670	977	22.7	472	34.6	9,899	95	52.8
1930	36,360	16,320	52,680	4.1	38,389	2,745	1,057	23.5	535	37.1	12,164	97	63.8
Grand Trunk Western....1931	4,899	7,800	12,699	10.2	23,769	1,431	504	20.9	276	22.0	3,428	100	47.0
1930	4,612	9,763	14,375	6.8	23,886	1,607	585	21.0	309	23.4	4,358	95	52.2
Lehigh Valley 1931	21,992	5,286	27,278	10.0	29,480	1,803	733	24.6	364	23.3	7,386	128	41.7
1930	20,345	8,040	28,385	8.4	28,244	2,016	882	26.5	459	26.5	9,696	127	50.4
Michigan Central 1931	24,274	16,781	41,055	6.7	33,354	1,837	617	19.7	190	16.3	4,178	99	60.7
1930	24,116	13,409	37,525	4.9	33,473	1,956	714	21.4	262	20.3	5,269	94	66.5
New York Central.....1931	78,335	64,103	142,438	12.0	33,409	2,285	922	25.1	344	22.8	7,566	93	44.2
1930	76,842	63,695	140,537	6.0	32,679	2,413	1,016	25.8	402	25.1	8,740	93	47.2
New York, Chi. & St. L..1931	15,611	7,953	23,564	9.9	29,431	1,860	665	21.1	436	34.2	6,190	94	65.3
1930	15,491	9,004	24,495	9.3	28,962	1,910	699	21.4	513	39.1	7,568	92	70.5
Pere Marquette 1931	12,431	4,394	16,825	3.5	23,087	1,538	627	26.0	368	23.6	2,813	86	64.9
1930	9,516	5,931	15,447	4.1	23,097	1,592	612	23.2	515	36.3	3,614	85	69.6
Pitts. & Lake Erie.....1931	20,001	4,841	24,842	8.2	40,467	3,163	1,787	47.4	177	6.2	18,701	89	32.6
1930	17,497	5,548	23,045	6.2	42,104	3,332	1,929	46.6	279	9.7	27,745	89	48.9
Wabash 1931	20,808	8,884	29,692	8.2	33,735	1,799	613	19.6	401	32.4	4,766	101	50.9
1930	18,873	9,942	28,815	3.4	31,318	1,909	702	21.6	526	38.8	6,073	101	61.9
Central Eastern Region:													
Baltimore & Ohio.....1931	79,220	19,359	98,579	5.6	26,979	2,087	905	29.2	400	23.0	7,123	131	46.3
1930	80,162	25,059	105,221	5.2	26,137	2,263	1,040	31.1	510	26.6	9,689	129	56.8
Big Four Lines.....1931	24,687	22,414	47,101	7.1	30,897	1,934	855	27.9	365	21.4	6,311	104	49.4
1930	24,146	22,718	46,864	3.4	30,938	2,037	937	29.8	470	25.6	8,115	102	54.4
Central of New Jersey...1931	16,876	7,426	24,302	13.9	24,985	2,019	876	29.5	210	12.7	7,358	134	41.2
1930	17,303	9,379	26,682	7.6	25,381	2,046	943	31.7	279	15.4	10,768	130	53.7
Chicago & Eastern Ill....1931	5,984	3,297	9,281	11.0	24,394	1,461	563	24.2	373	26.4	3,687	117	39.2
1930	13,226	3,660	16,886	45.3	26,619	1,670	716	25.8	274	16.4	4,881	114	43.7
Elgin, Joliet & Eastern..1931	9,451	3,555	13,006	6.0	16,301	1,888	936	38.7	197	8.6	5,739	114	31.8
1930	9,547	5,382	14,929	4.5	16,765	2,089	1,082	39.2	287	11.7	9,471	108	45.9
Long Island 1931	781	4,589	5,370	.9	6,646	753	278	26.6	78	5.5	1,051	322	44.2
1930	763	4,894	5,657	1.0	7,481	1,019	376	25.8	99	7.4	1,405	267	40.8
Pennsylvania System.....1931	240,786	56,926	297,712	5.8	30,987	2,244	990	29.2	332	18.4	9,307	117	48.4
1930	229,498	73,972	303,470	4.3	30,221	2,439	1,122	30.5	411	21.3	11,698	112	50.7
Reading 1931	37,053	10,141	47,194	5.2	23,884	1,995	912	33.4	294	15.4	9,550	129	45.7
1930	32,871	10,584	43,455	4.8	23,311	2,079	995	35.0	413	19.9	12,404	127	56.2
Pocahontas Region:													
Chesapeake & Ohio.....1931	47,771	9,638	57,409	2.8	45,824	3,443	1,855	46.0	1,022	40.5	18,863	71	49.5
1930	41,904	10,674	52,578	2.5	40,896	3,187	1,723	45.1	1,212	48.0	20,650	77	64.4
Norfolk & Western.....1931	36,576	5,382	41,958	.9	43,656	3,020	1,571	42.9	800	31.9	14,770	104	48.7
1930	34,081	7,279	41,360	1.0	45,088	3,199	1,705	44.4	1,013	38.9	18,783	105	56.7
Southern Region:													
Atlantic Coast Line.....1931	26,852	4,382	31,234	6.4	17,781	1,055	368	18.8	190	16.2	1,149	117	34.5
1930	24,212	5,191	29,403	6.6	19,768	1,331	500	20.5	289	22.0	1,645	105	37.8
Central of Georgia.....1931	7,198	2,559	9,757	16.2	19,645	1,213	445	20.6	353	26.7	1,812	128	54.6
1930	6,171	2,905	9,076	11.0	19,119	1,292	511	21.1	440	30.3	2,104	121	52.5
Ill. Cent. (inc. Y. & M. V.)1931	52,634	14,068	66,702	11.9	24,904	1,584	603	25.9	451	29.9	4,508	124	56.3
1930	49,215	17,530	66,745	6.0	25,772	1,793	728	27.2	570	35.1	5,682	118	63.6
Louisville & Nashville....1931	49,794	7,909	57,703	14.6	22,789	1,547	715	32.6	450	24.1	4,933	130	56.7
1930	48,724	11,130	59,854	10.5	22,515	1,545	730	32.8	543	28.1	6,191	133	68.6
Seaboard Air Line.....1931	17,186	3,704	20,890	12.3	19,477	1,333	481	20.7	341	26.8	1,596	127	54.2
1930	14,962	4,676	19,638	3.9	19,494	1,436	542	21.8	411	30.6	1,804	123	51.4
Southern 1931	55,248	11,202	66,450	13.5	20,570	1,295	485	20.2	277	21.0	2,761	142	40.1
1930	53,749	13,372	67,121	13.3	20,206	1,346	519	21.8	326	23.4	3,274	140	44.7
Northwestern Region:													
Chi. & North Western...1931	44,558	21,671	66,229	8.7	22,189	1,558	558	22.0	316	23.7	2,477	113	50.8
1930	50,112	25,164	75,276	7.4	22,468	1,653	617	24.0	368	26.1	3,278	110	57.1
Chi. Gt. Western.....1931	4,361	4,567	8,928	8.6	32,217	1,986	741	23.8	664	48.7	4,062	118	74.8
1930	4,086	4,473	8,559	6.6	29,429	1,945	738	22.3	763	55.4	4,475	115	94.4
Chi., Milw., St. P. & Pac.1931	61,204	15,488	76,692	2.4	24,682	1,674	666	25.3	389	25.8	2,642	111	54.7
1930	58,268	18,168	76,436	2.6	25,034	1,834	765	26.7	516	32.1	3,486	107	61.5
Chi., St. P., Minn. & Om.1931	2,232	8,205	10,437	10.2	17,986	1,277	513	24.4	392	25.8	2,387	108	53.0
1930	2,523	9,992	12,515	7.8	17,390	1,259	531	25.6	461	28.2	3,346	104	72.5
Great Northern 1931	43,652	9,410	53,062	5.9	30,844	2,218	987	29.4	402	22.6	2,551	103	35.5
1930	42,318	12,276	54,594	5.4	31,498	2,496	1,246	32.9	651	30.8	4,260	97	47.9
Minn., St. P. & S. St. M.1931	20,798	3,567	24,365	3.8	19,728	1,344	555	23.7	263	17.5	1,481	95	56.9
1930	20,017	4,753	24,770	3.5	21,798	1,699	781	26.9	464	26.3	2,627	84	68.9
Northern Pacific 1931	41,678	5,770	47,448	10.2	25,462	1,685	628	22.3	288	20.5	2,117	134	47.3
1930	40,967	6,411	47,378	9.3	26,230	1,932	803	24.9	411	25.4	3,005	126	53.2
Ore.-Wash. R.R. & Nav..1931	8,425	3,248	11,673	2.1	23,213	1,560	651	24.3	310	18.5	1,632	133	47.1
1930	8,079	4,204	12,283	4.1	23,553	1,728	750	26.0	395	22.4	2,160	140	51.6
Central Western Region:													
Alton 1931	10,569	3,037	13,606	9.9	27,242	1,526	539	23.4	281	21.5	3,820	115	56.0
1930	10,300	4,681	14,981	6.1	24,759	1,528	601	24.6	352	23.4	5,268	113	63.8
Atch., Top. & S. Fe (incl. 1931	68,761	12,207	80,968	9.0	33,021	1,927	695	23.2	439	31.3	3,078	93	60.3
P. & S. F.).....1930	66,286	15,761	82,047	7.3	32,437	1,988	699	21.5	470	34.8	3,426	95	66.1
Chi., Burl. & Quincy....1931	44,754	13,781	58,535	7.0	26,071	1,752	752	25.7	469	30.6	2,967	110	56.8
1930	45,010	19,762	64,772	5.3	27,278	1,982	915	28.4	620	35.5	4,333	105	61.4
Chi., Rock I. & Pacific..1931	38,546	12,149	50,695	11.3	23,393	1,509	609	25.4	418	27.0	2,791	121	57.4
1930	35,816	16,087	51,903	8.6	22,933	1,598	658	25.5	521	32.8	3,563	120	63.7
Denver & R. G. Wn.....1931	13,545	4,336	17,881	2.7	25,169	1,806	664	22.5	280	20.2	1,958	152	36.9
1930	12,475	5,291	17,766	2.2	24,156	1,798	647	23.4	349	25.5	2,423	152	48.8
Los Angeles & Salt Lake.1931	4,475	1,052	5,527	3.7	25,191	1,595	581	20.9	524	37.8	2,336	137	53.0
1930	4,832	1,279	6,111	2.3	26,415	1,806	716	23.8	620	39.1	3,107	130	55.5
Oregon Short Line.....1931	7,953	3,687	11,640	5.3	26,034	1,634	606	21.8	452	32.6	2,077	99	52.9
1930	8,055	3,550	11,605	5.3	26,810	1,845	728	24.3	580	38.0	2,652	98	55.8
So. Pacific—Pacific Lines.1931	41,940	24,771	66,711	9.8	26,791	1,868	643	21.2	358	27.1	2,675	111	47.0
1930	41,020	26,110	67,130	4.7	26,882	1,986	680	21.2	485	36.9	3,628	111	62.9
Union Pacific 1931	24,790	9,617	34,407	7.0	45,789	2,313	741	19.7	642	55.7	5,867	97	70.4
1930	23,542	11,797	35,339	6.3	41,952	2,251	747	20.9	840	67.8	7,883	95	95.7
Southwestern Region:													
Gulf, Colo. & S. Fe.....1931	10,618	2,452	13,070	2.5	27,979	1,724	724	27.8	353	20.9	2,350	92	55.3
1930	11,997	3,409	15,406	3.1	35,652	2,396	1,071	30.0	504	27.2	3,954	83	64.4
Mo.-Kans.-Texas Lines...1931	12,404	4,751	17,155	4.7	27,159	1,718	636	23.0	427	32.0	2,235	82	51.9
1930	17,111	6,376	23,487	4.6	29,441	1,970	777	24.2	419	29.3	3,095	80	54.9
Missouri Pacific 1931	31,745	17,387	49,132	11.4	28,512	1,772	685	24.7	572	38.7	3,789	112	72.8
1930	31,171	18,804	49,975	10.5	28,448	1,907	775	26.3	701	44.3	4,722	108	75.4
St. Louis-San Francisco..1931	27,141	6,814	33,955	3.1	22,631	1,471	565	23.7	359	25.4	2,359	120	47.3
1930	26,167	7,774	33,941	3.3	22,017	1,605	620	23.8	437	30.9	2,871	125	55.0
St. Louis Southwestern 1931	6,227	3,471	9,698	8.9	24,087	1,485	554	21.6	370	27.2	1,886	99	48.2
Lines 1930	6,900	3,394	10,294	5.5	23,267	1,511	564	21.2	438	31.6	2,498	99	68.1
Texas & New Orleans....1931	12,070	11,924	23,994	7.1	20,906	1,396	537	23.8	344	23.5	1,762	93	48.2
1930	11,827	13,567	25,394	4.8	21,437	1,509	592	23.6	459	30.4	2,491	90	62.7
Texas & Pacific.....1931	6,643	5,507	12,150	12.2	24,960	1,673	617	23.9	473	33.4	2,956	83	39.5
1930	6,218	4,556	10,774	6.9	26,789	1,737	655	24.1	742	52.0	4,100	83	51.1

Reducing Maintenance Costs

(Continued from page 643)

meters directly into the crankcase, thereby eliminating the use of containers as measuring devices. During the greasing and oiling service, and before the coach leaves the greasing pits, it is given a thorough inspection, one of the most important items in the entire maintenance routine. The greasing pits are equipped with a well-planned flood lighting system, with lights set back in recesses, and protected by a heavy steel screen. The inside of these recesses is painted white to afford a maximum amount of reflection. All plugs and lights are of the water-proof marine type.

The service inspection routine requires a preliminary examination of the driver's defect report, and defects shown thereon are incorporated in the shop order made out by the inspector. Interior inspection of the coach notes the condition of upholstery, seats, lights, floor, paint finish and fire extinguishers. Outside inspection includes the body, chassis, wheels, drive lines, motor, tires and brake testing. Should this rigid inspection reveal no defects, the inspector signs a car clearance card and the coach is then moved forward into the storage section, ready for immediate road service.

Should the inspector find that the coach must be sent to the service shop, he makes a complete service report, including data obtained from the driver's defect card, his own inspection and from the coach service card, which is carried inside the coach and shows dates and classification of services rendered. When the coach reaches the service shop, all pertinent data are ready for handy reference by shop foreman and mechanics.

Servicing Facilities

The service shop has accommodations for eighteen motor coaches at one time. Service pits are available for nine of these coaches where drive lines, motors, chassis, etc., may be repaired. One of these pits is especially designed for removing and installing Twin Coach motors. Extending along one side of the service room, and connecting at right angles with each of the service pits, is a large pit, 100 ft. in length, 6½ ft. deep and 8 ft. wide. A work bench extends the full length of this connecting pit and is completely equipped with vises, bench drills and other apparatus, spaced at intervals to accommodate mechanics at work in the service pits. Permanent reinforced ramps cross this connecting pit, making it possible to drive coaches into the storage section.

Stationary service benches, 30 in. wide and 8 ft. long, are located between the pits on the floor level. These consist of six drawers, three on each side, to hold mechanics' tools and equipment. Location of these benches was determined after a careful study of mechanics' needs, and they have been placed in such position as will eliminate lost motion and conserve, as much as possible, time and effort in motor repair work.

Between and at the end of the service pits, four-inch exhaust pipes have been installed to extend through the roof. Connections are made between these pipes and motor exhausts to carry off all gases when motors are run in testing operations. Another feature of the service room is the overhead monorail system, equipped with trolleys and hoists for the handling of motors and other heavy parts between the service shop and the machine shop or the parts-cleaning room.

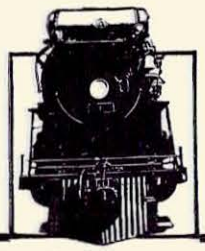
The machine shop and unit repair shop have a floor space of 3500 sq. ft. Both shops are equipped with all machinery necessary to completely overhaul and maintain motors, air compressors, differentials, axles and transmissions; in short, every unit on the motor coach with the exception of spring making and spring repair. Included in the machinery are lathes, cylinder boring, line boring and crankshaft grinding machines, and drill presses. The welding or blacksmith shop is equipped to handle aluminum and cast-iron welding, such as motor bases, motor blocks, motor heads and similar work. Rebabbitting of bearings is also done here. The equipment includes a forge, gas oven, air hammers and all other necessary tools.

The electrical shop is completely equipped with every device needed for the testing and repair of electrical units such as generators, starters and ignition units. A separate battery room is equipped with facilities for construction of new batteries as well as repairing old batteries and recharging. In the body shop, provision is made for working on three coaches at the same time. Equipment here consists of a universal wood working machine, a combination of band saw, planer, shaper, and mortising and boring machine; a 22-in. drill press; a metal break; a metal shears; a metal bending machine; a glass grinding and polishing machine, and other equipment necessary to body repair or construction work. Trimming work is done on a mezzanine floor over the tire and oil rooms and connecting with the body shop.

The paint shop will accommodate four coaches at one time and is fitted with the injector type of exhaust ventilation. Air ducts are made of heavy galvanized sheet iron, having flanged and bolted clean-outs every ten feet. These clean-outs are of sufficient size to admit a man's body. On one side, the air is taken from near the ceiling, and on the other side, from the

Interior of the Garage, Showing Service Shop at Right, and Storage Section at Left

Continued on Next Left Hand Page



RETURN of BUSINESS

will find a NEW Railroad

■ AS BUSINESS FELL OFF, the less economical locomotives were "white-leaded". The efficient power was used more intensively, until today a far larger proportion of the traffic than ever before is handled by relatively modern power. As a result, net returns are holding up surprisingly well.

But the whole railroad is now geared up to the performance of its best locomotives. Return the older ones to service as business improves and you will retard operations, with a disastrous effect on net income.

Get ready now. Have sufficient modern locomotives to maintain the present standard of operating efficiency as business increases.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS

Incorporated

LIMA - - - - - - OHIO

floor. A hand-controlled water spray system is installed inside each air duct and the entire paint shop is equipped with an automatic sprinkler system. All motors operating the unit heater and the exhaust fan are located outside the paint shop.

Two stock rooms are maintained. One is operated by the stores department of Pacific Greyhound Lines, and through this store all spare units are handled and proper charges made. This also applies to shop tools. The other stock room is operated by the C. H. Will Motors Corporation, under contract with Pacific Greyhound Lines to maintain a complete stock of parts to care for requirements of Will coaches operated on the Oregon Stages Division.

The oil and grease storage room, 16 ft. by 50 ft., holds four oil storage tanks, each of 400 gal. capacity, and two tanks of 300 gal, capacity each. All are installed in a pit 9 ft. deep. Two of these tanks are arranged for storage of used oil drained from motors; two tanks are arranged for the storage of reclaimed oil, and two tanks are for storage of two grades of new oil. Each tank is equipped with gages indicating the number of gallons of oil in the tank at all times. At the grease pits, a funnel on a swing joint is installed and the used oil from the motor coaches is drained by gravity through a line into one of these tanks. From this tank, the used oil is pumped through a filtering plant where it is electrically heated, washed and separated and then discharged into another tank. The oil is then forced by air pressure to the grease pits where buses are served, and it is metered as served. Another connection leads to a service station outside the building, where coaches may be serviced without entering the pits. Thus a complete circuit is made for the oil to travel from crankcase to refinery and back to crankcase by manipulation of valves, gravity, air pressure and pumps. All tanks are in duplicate so that two separate grades of oil may be used and so valved that oil may be drawn from either tank.

Light and Heat

The service shop, storage section, wash rack and grease pits are covered by a saw-tooth type of roof, fitted with windows, to provide a maximum amount of uniform light during the day time. This roof also provides adequate ventilation. Each department is drained by gutters. These are 12 in. wide and 12 in. deep. These gutters are covered with steel grating and extend throughout the lower floor.

Heating is provided by a low-pressure steam boiler and the building is so constructed that it may be readily heated to comfortable temperature in cold weather. Offices, oil room, recreation room and tire room are heated by direct radiation. The rest of the building is heated by unit heaters suspended from the ceiling. These unit heaters are of the high-velocity jet type with recirculating ducts. They reach to six feet from the floor and are so placed as not to interfere with movements of motor coaches or floor trucks. Oil is used for heating the boilers, and a 12,500 gal. storage tank makes possible carload deliveries of fuel oil.

The gasoline storage facilities of the plant consist of three 5,000 gal. tanks installed 8 ft. underground with manholes to the ground surface. This allows for carload deliveries. Over these three tanks, located outside and to the rear of the building, is a concrete valve house, making all valves easily accessible and under cover in case of inclement weather. Suction and filling lines are so arranged with valves that any one or all three tanks may be filled or drawn from. On the valve house is installed an electrically-driven, remote-controlled gasoline pump supplying filling stations at the grease pits and outside the building. All gasoline is metered and the pump is controlled at the service stations. Four small air compressors are installed in parallel above the tire shop with all controls on the floor below, and are so arranged that any number may be operated at the same time. Air outlets are located at every possible necessary location throughout the entire building.

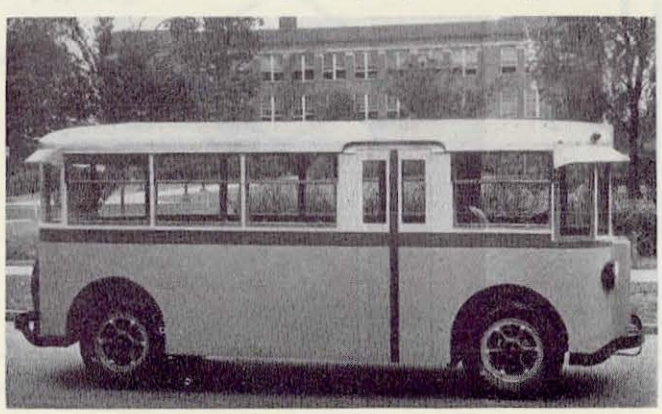
There are overhead doors to the entrances of the wash rack, service shop, storage and paint shop, a number of which are electrically operated with stations on both sides of the doors. All machines are equipped with unit drive with three-phase, 60-cycle motors. The lighting circuit is single-phase, three wire. At intervals throughout the repair shops and storage room, emergency lights have been installed which may be turned on irrespective of other lights. All light circuits and power feeders are controlled from one central point in the machine shop, except the lighting circuits for the second floor office lights. No wire less than 12-gage is used. All outlets in the paint shop are water and gas proof.

Twin Coach Offers 17-Passenger Model

A SMALL Twin Coach, known as Model 15 and designed to accommodate 17 seated passengers, and to provide maneuverability in traffic through a wheel base of 132 in. and a width of 69 in., has been placed on the market by the Twin Coach Corporation, Kent, Ohio. The unit is of all-metal construction, with body sides and roof of duralumin. It has a 6-cylinder Hercules engine of Twin Coach design. The overall length, including bumpers and visors, is 215½ in.

The body and running-gear structural frame work are all steel, riveted together. Glass is used clear around the body. The entrance door is back of the right front-wheel housing and consists of a two-leaf hinged door. The emergency door is located on the left side, directly opposite the service door. The seating arrangement consists of 4 dual seats facing forward on the left side and 3 single seats facing forward on the right side, with one single seat facing toward the rear over the right front-wheel housing, and 4 seats facing forward across the rear end.

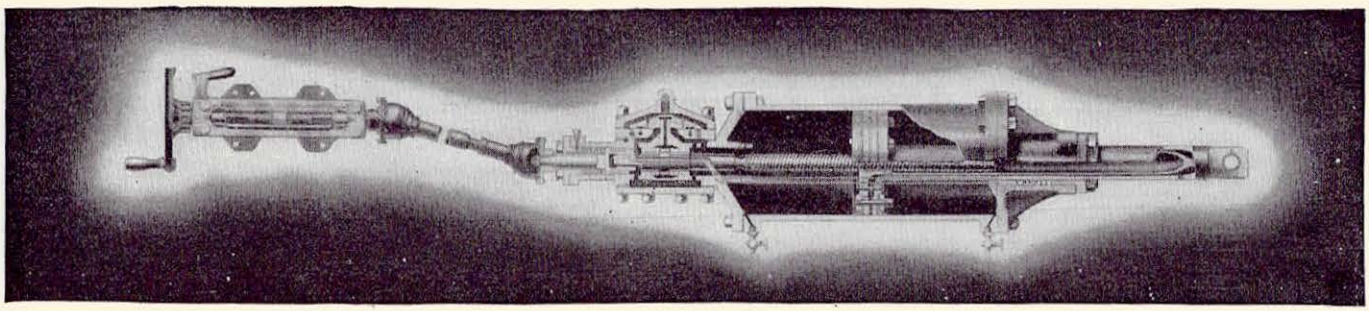
The springs are 42 in. long and 2 in. wide and are of chrome-vanadium steel. Timken axles are provided at both front and rear, and brakes are of the four-wheel internal-expanding hydraulic type.



The New 17-Passenger Twin Coach

Odds and Ends Department Appears on Next Left Hand Page

Accurate control
FOR MODERN POWER



MODERN LOCOMOTIVES, with their tremendous power, long ago outgrew hand control.

Franklin Precision Power Reverse Gear is the modern method.

Every change in operating conditions can be met easily by a change in cut-off and this without effort by the engineman. The cut-off is retained at any point until the engineman wishes to change it.

Franklin Precision Power Reverse Gear improves the control of the modern locomotive and does so without shock to any part. It is an essential element in the effort for fuel economy, and requires no emergency steam line since it can be manually operated in the event of air failure.

Franklin Type E Power Reverse Gear gives Precision advantages with lever instead of hand wheel operation for those who prefer it.

THE FRANKLIN SLEEVE JOINT
Does not become rigid under pressures.

FRANKLIN RAILWAY SUPPLY Co., Inc.

NEW YORK • CHICAGO • SAN FRANCISCO • ST. LOUIS • MONTREAL

Rate Rise Application Denied

(*Continued from page 639*)

parently it cannot be put into effect unless they are practically unanimous.

It is also noteworthy that while the commission has adopted many of the arguments and suggestions advanced by counsel for the National Industrial Traffic League committee in its capacity as a "neutral," including the pooling plan, its substitute plan, taken at its face and including intrastate rates, would give the roads to be pooled only about half what the league committee suggested, which was an increase of 6.7 per cent intended to allow $225,000,000, or enough to make one and one-half times fixed charges for the deficient roads. During the hearings the league was advised specifically by the railroad executives that they would not assent to the pooling of the rate increase, although the league's counsel, Luther M. Walter, in his brief, pointed out that they did not state that they would not assent if that were essential to obtain from the commission permission for some rate increase. Fairfax Harrison, president of the Southern, in declining to assent to the plan, gave as a reason that "we are not yet socialists." It was stated that three railroads had indicated a willingness to subscribe to a pooling plan but apparently they are roads which under the commission's specifications would not participate in the pool.

Although it is apparent that most of the rumors as to the nature and date of the decision were unfounded, and perhaps some hopes were aroused by a theory that the four commissioners were collaborating on a dissenting opinion while their seven colleagues had been more generous, the stock market on Tuesday afternoon acted as if Wall Street had received some more specific information and railroad stocks went up two to five points. There were even rumors before the decision was released at 3:30 p. m., that the commission had allowed a $6 per car surcharge. At any rate the stocks lost more than these gains on Wednesday morning.

In an exhibit introduced during the rate hearings by Fairman R. Dick at the request of the National Industrial Traffic League, estimating the income of the Class I railroads that earned over $10,000,000 in 1929 on the basis of six months of this year and comparing it with fixed charges requirements (not interest obligations) the following were shown as earning less than *fixed charges:* Buffalo, Rochester & Pittsburgh; Chicago, Indianapolis & Louisville; Detroit, Toledo & Ironton; Elgin, Joliet & Eastern; New York, Chicago & St. Louis; Pere Marquette; Wabash; Central of Georgia; Florida East Coast; Illinois Central; Seaboard Air Line; Southern; Chicago & Alton; Chicago, Milwaukee, St. Paul & Pacific; Chicago & North Western; Chicago, St. Paul, Minneapolis & Omaha; Colorado & Southern; Denver & Rio Grande Western; Missouri-Kansas-Texas; St. Louis-San Francisco, and St. Louis Southwestern.

Although Wednesday morning looked like a good time for the Administration to trot out its plan, if it has one, for bolstering up the railroad bonds held by savings banks, trustees, etc., no announcement on the subject was made during the day. Some friends of the President insist that he has scrupulously refrained from any contact with the Interstate Commerce Commission during its consideration of the case and has been eagerly waiting to learn what its decision would be, while many others decline to believe that he has not known what the commission was doing and that that was his reason for indicating concern as to the bond situation.

Odds and Ends . . .

A Real Safety Record

Hearty congratulations go to Foreman Pete Wilmoth of the Chicago, Rock Island & Pacific, at Aline, Okla. He has completed 30 years of service on section 9 of the Panhandle-Indian Territory division without having had a reportable injury or a derailment occur on his section.

These Dependable Commuters

We are informed that John and Joseph Cuneo, two brothers residing in Carlstadt, N. J., have been commuting between Carlstadt and New York for 35 years and not once has either of them failed to buy his monthly commutation ticket. The Erie is to be congratulated upon having such regular customers.

Inbound Traffic Will Probably Predominate

The problem of what to do with old railway stations—which seems much more interesting to us than the ancient question of what to do with old razor blades—has been solved, as far as the station of the Chicago, Milwaukee, St. Paul & Pacific at Fond du Lac, Wis., is concerned. The city of Fond du Lac wants to lease the station for a period of two years and proposes to use it as a jail.

A *Very* Pleasant Example

"Another pleasant example we in England might follow," says the Railway Gazette (London) in an editorial on railway dining car service, "and one which would, at the cost of no great trouble, surely add much to the attractiveness of railway travel, is the practice of a well-known Irish railway which provides refreshments on every corridor train, no matter at what hour of the day. On the less important trains a special restaurant car is not required, but only a pantry which need occupy no more space than that allotted to a couple of ordinary compartments. The sudden yearning for a cup of tea or a sandwich, or the natural desire to drink the health of a congenial traveling companion, could then be satisfied on many more occasions than present circumstances permit."

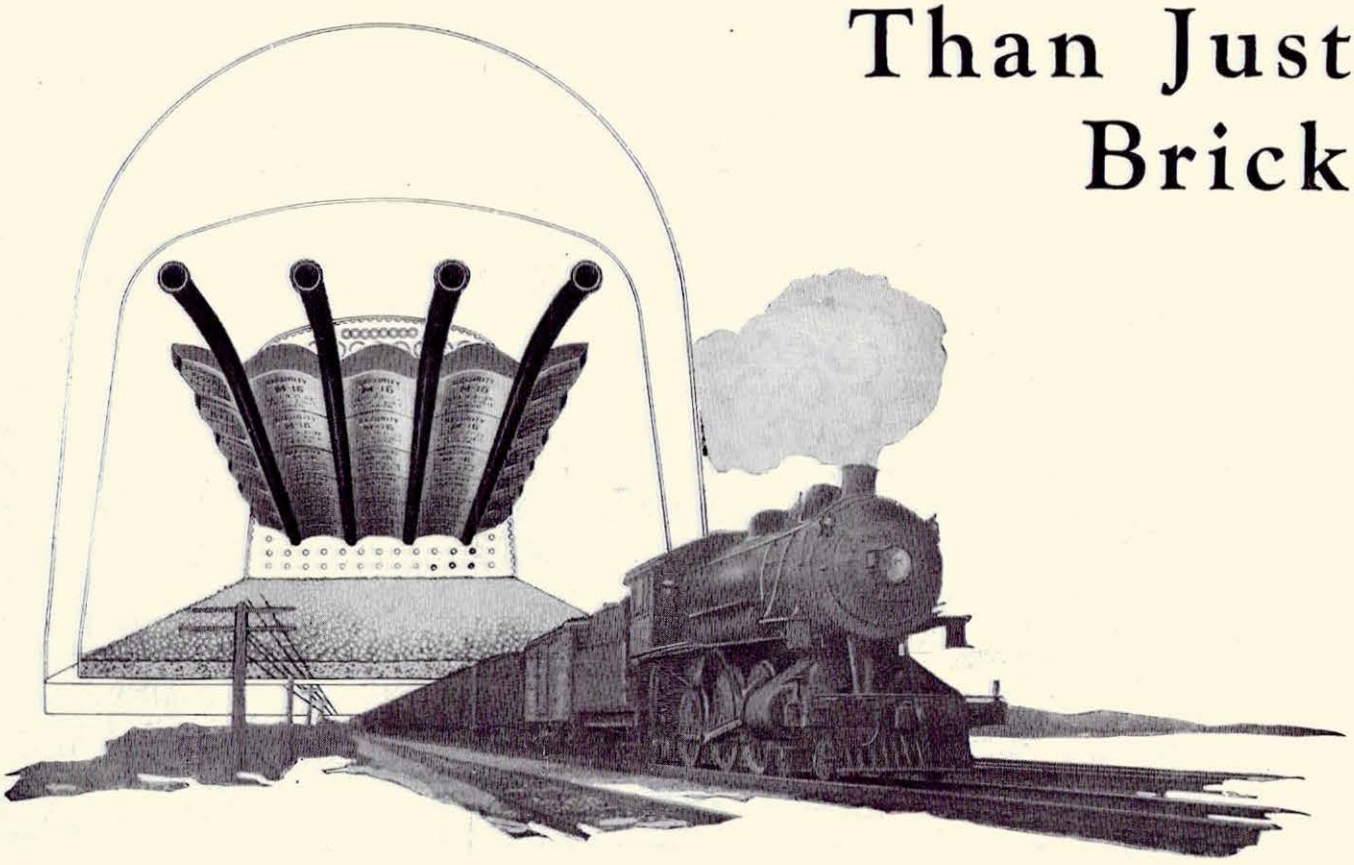
Passenger Traffic on Freight Trains Reaches New Peak

Many of the railways' passenger trains may be running half loaded, or worse, but, from all reports, the number of persons stealing rides on freight trains is greater than it has been for many years. Hoboes and men looking for work—even entire families—are trying to ride the freights in astonishing numbers. According to an interesting story in the New York Herald-Tribune, 25 per cent more illegal riders are being pulled off Pennsylvania trains in 1931 than in 1930. Forty per cent more arrests of illegal riders were made on the New York Central during the first eight months of 1931 than in the same period of 1930, according to the same source. The chief of police on the New York Central is quoted as saying that one would have to go back many years to find the "jungles" of the hoboes so crammed as they are today, and so many non-hoboes trying the dangerous venture of stealing train rides to get to other cities.

In the vicinity of New York and more or less throughout the East, the railroads are increasing their police patrols about the freight yards at night. In the West, the task of keeping these non-paying riders off the freight trains is said to have proved too great, and the efforts of the police are directed largely toward preventing unwelcome travelers from getting off the trains when they arrive in town. They have decided that the best thing to do is to keep the hoboes on the move.

News Department Begins on Second Left Hand Page

There Is More To Arches Than Just Brick



THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

WHEN you were designing new locomotives, American Arch Company engineers cooperated in laying out the Arch.

When the new locomotives left the builders, American Arch Company service men checked the Arch and made sure it got off to a good start.

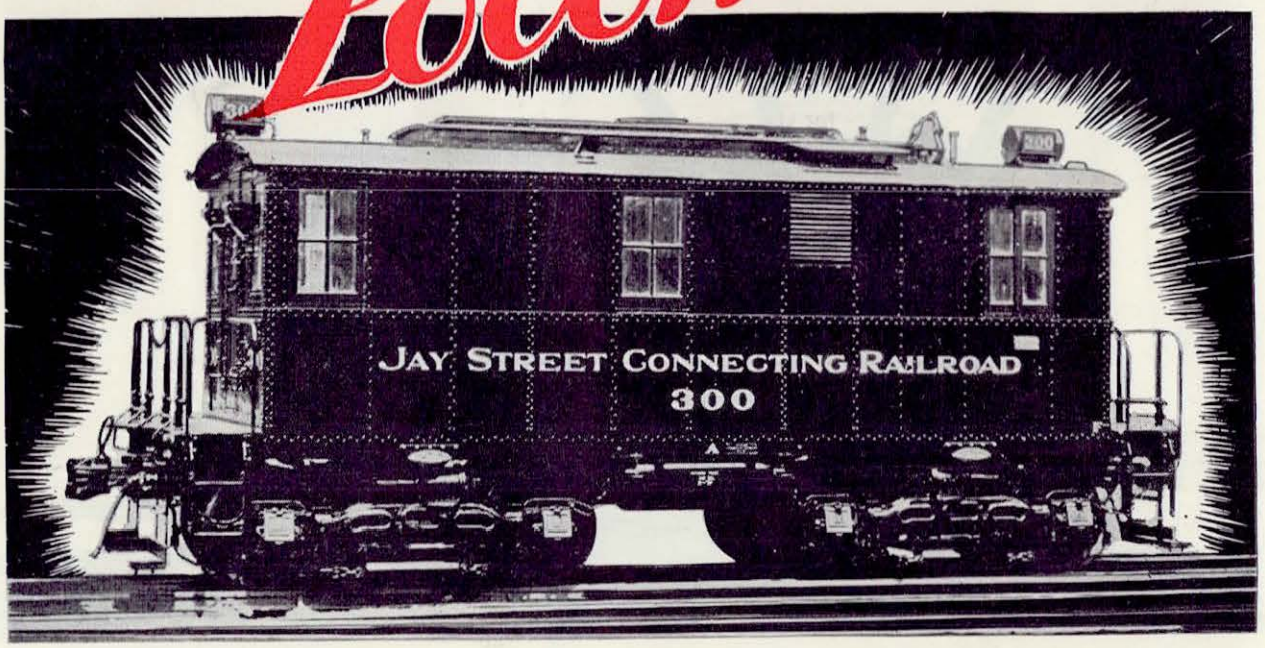
When combustion troubles developed, American Arch Company experts were soon on the ground cooperating in solving the problem.

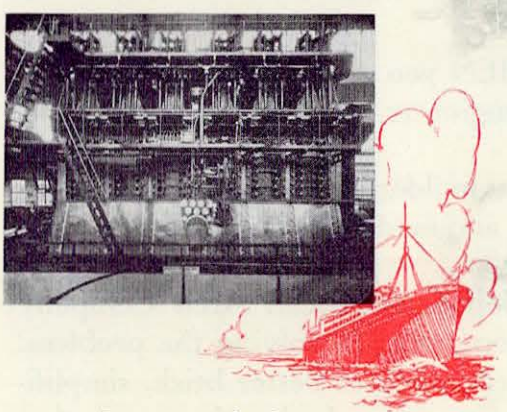
Improvement in Arch design, development of better brick, simplification of patterns, modernization of storage methods—these are other activities currently carried on by American Arch Company for the benefit of the railroads. All of them have a real dollar and cents value.

HARBISON-WALKER REFRACTORIES CO.
Refractory Specialists

AMERICAN ARCH CO.
INCORPORATED
Locomotive Combustion Specialists

Introducing Deisel Locomotive





Let us submit cost and performance data

THE fitness and economy of the McIntosh & Seymour Diesel Engines have been thoroughly demonstrated in many industries.

In marine service, their dependability and sustained high operating economy are proven by countless ship performances.

In many municipal electric power and water plants, McIntosh & Seymour Diesel Engines are earning enough to pay most of the civic expenses. In one instance a city has been made tax-free for three years and a big surplus has been placed into its treasury.

In oil pipe line pumping, where pumps must be driven 24 hours a day for months without shutdown, the assured continuity of operation of McIntosh & Seymour Engines has been largely responsible for the steady transition from Steam to Diesel Power. Recent pumping station orders include 24 - 300 B. H. P. units for Gulf Pipe Line Company and 15 - 500 B. H. P. units for Ajax Pipe Line Company. One pipe line company installed 31 units in 1929—another operates 59 units, some of which have been in steady service since 1916.

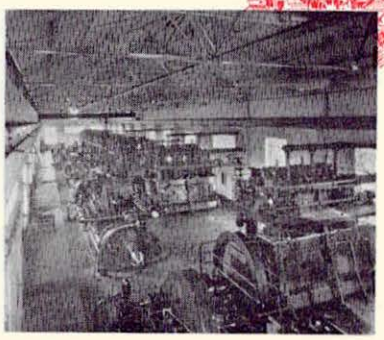
The prominence of McIntosh & Seymour Engines in the above fields is largely due to the following outstanding qualities:

Sustained high thermal efficiency
Instant Starting
No stand-by losses
Low cost for fuel consumed
Assured continuity of service
Full capacity without time loss
Smokeless and Odorless

AMERICAN LOCOM

30 CHURCH STREET

the ALCO .....



AND now this same organization has developed the Alco Type Diesel Railway Engine which in the Alco Diesel Locomotive combines these general features with the following further essentials and advantages necessary for efficient railway service.

Light weight and yet sufficient ruggedness to stand up indefinitely in railway service

Very high tractive effort for starting and steep grades. Full power is developed at all speeds.

Quick acceleration, as practically the whole locomotive weight is available in starting

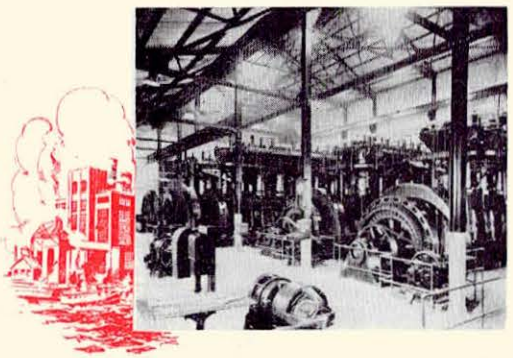
High mileage on each fueling. Stops for water are practically eliminated.

High economy even on short light traffic runs because of low fuel and operating costs.

Complete, safe and comfortable control.

Fixed parts are rugged and indestructible.

Ease of maintenance.



Alco Type Diesel Locomotives, now available in 300 and 600 HP units, are the product of the American Locomotive Company, an organization that has been identified with railway progress since railways were new. They have been designed particularly for railroad men and railroad service. When operated within our recommended range of load and use factors, they will effect substantial reductions in operating expenses.

OTIVE COMPANY

NEW YORK, N. Y.

NEWS

Truck Operators Are Losing Money

Carl R. Gray, Jr., cites experience with rail subsidiary to show lack of real profit

Truck operators as a whole are not enjoying a fair return upon their investment, or even making any money at all; and they cannot so long as they are allowed to run indiscriminately without rate regulation or proper accounting methods, including proper charges to depreciation, according to Carl R. Gray, Jr., vice-president and general manager of the Chicago, St. Paul, Minneapolis & Omaha, in a recent article, "Transportation as the Western Man Sees It," published in the Alumni Bulletin of the Harvard University Graduate School of Business Administration. Mr. Gray used figures compiled after two years' operation of the Wilson Transportation Company by the Omaha railroad.

"On September 1, 1929, our railroad bought the Wilson Transportation Company, a common carrier truck system radiating out of Sioux Falls, S. D.," Mr. Gray says. "In 1930 this company grossed $217,570, and, after the operating charges and taxes were deducted, it had a surplus available for interest on its investment in the sum of $1,283, against the outstanding capital of $275,000.

"Notwithstanding the fact that the company operated approximately 1,000,000 truck miles in the most densely populated section of South Dakota, and operated trucks between such terminals as Sioux City, Sioux Falls, Mitchell, Brookings, Chamberlain and other smaller cities of that portion of the state; secured and hauled approximately 90 per cent of the goods offered for truck haul; enjoyed a tariff which was on the average of five cents per 100 lb. by classes and commodities over that of the rail rate; was managed and operated in a careful, attentive manner; kept its accounts strictly in accordance with a modified form of accounting patterned after standard Interstate Commerce Commission rulings, this small surplus was all that could be shown for our efforts; and leads me to believe that truck owners as a whole are actually losing money.

"The facts of the Wilson Transportation Company, our line, are presented only to show that in South Dakota this one truck line took approximately $218,000 from what was really the net revenue of the railroad carriers because none of them were able to reduce their expenses incident to the loss of this business; and yet, with all the advantages that it had, was not capable of earning more than one-half of one per cent on its outstanding stock which was nearly all invested in transportation equipment and station buildings."

Trucks and Buses Endanger Motorists

One of the greatest railroad achievements in the last twenty years has been the increase made in safety of operation. Hundreds of millions of dollars have been spent in making improvements to equipment and in the removal of dangerous crossings. What have motor carriers done along this line? Practically nothing, I should say. On the contrary they are ever increasing the size of their vehicles and, attempting to shorten their schedules, bus drivers are forced by fast schedules to break speed laws, to disregard the rights of motorists and to endanger the lives not only of those motorists but of the bus passengers as well. On a recent visit to the mountains of western Maryland I attempted for a brief spell to pace a large bus loaded with passengers. I estimate that the bus and its passengers were traveling at the rate of seventy miles an hour. Who will say that this pneumatic-tired bus, so wide that it covered fully half the road, was being operated safely and with regard for its passengers and the motorists it met and passed? This is no exaggerated case, and I have no doubt each of you has met with a similar experience.

—Milton W. Harrison in an Address to the Birmingham Traffic and Transportation Club.

Senator Couzens Proposes Legislation

Senator Couzens, chairman of the Senate committee on interstate commerce, has announced his intention of introducing at the coming session of Congress a new bill to provide for the regulation of motor vehicle transportation, including trucks as well as buses, but apparently more with the idea of obtaining public reaction to the proposals than of pressing such legislation at this session. He also indicated his intention of reintroducing his resolution to hold up consolidations.

Rail Entry Would Aid Water Transport

Full development of coastal and inland lines impossible if railroads are barred

Pleading that the railroads be freed from the restrictive laws now prohibiting them from engaging in coastwise and inland water transportation, George D. Ogden, New England vice-president of the Pennsylvania, at the recent convention of the Atlantic Deeper Waterways Association in session at Boston, Mass., declared this necessary for "the healthy and intelligent development of water transport itself."

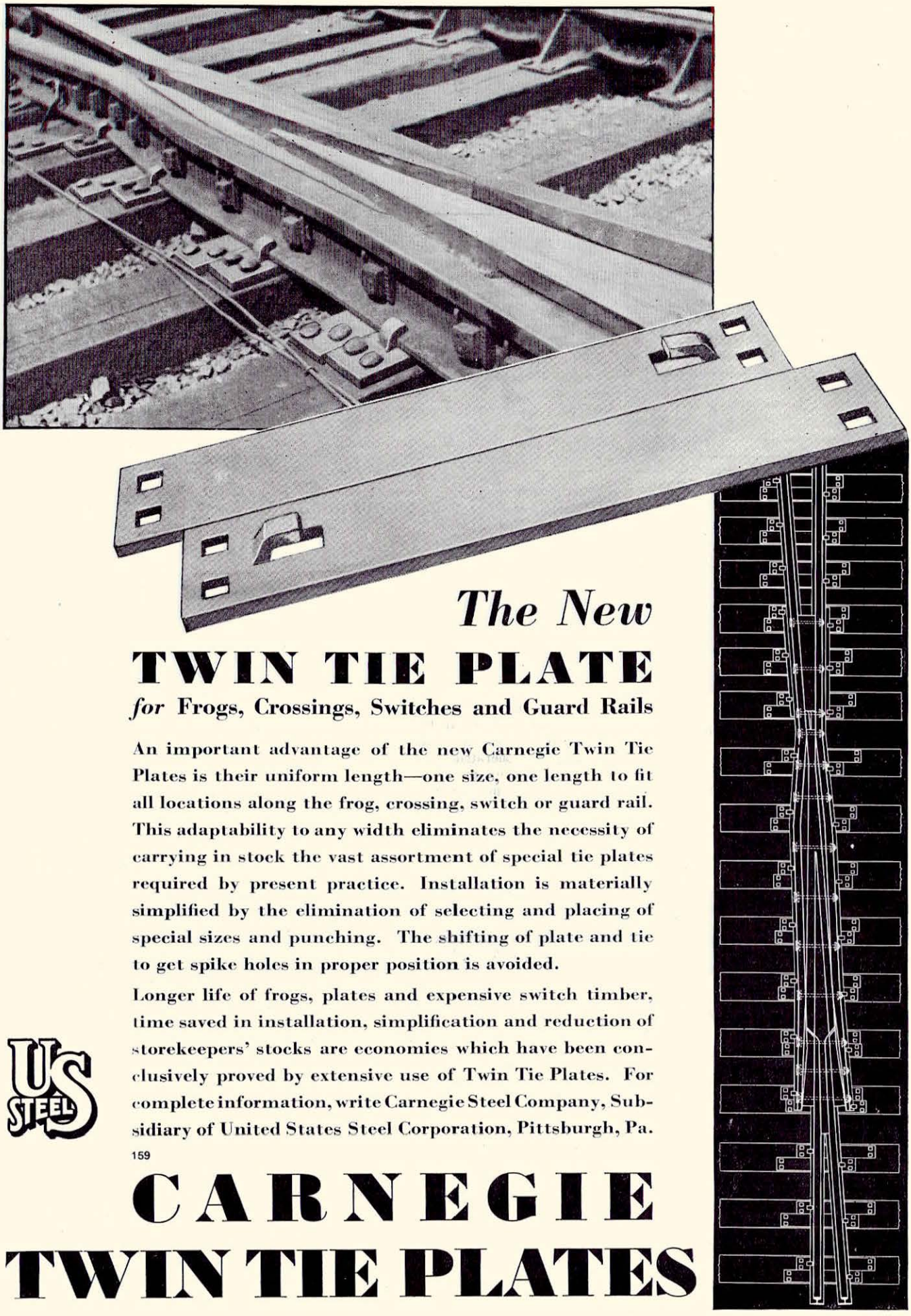
"The railroads," he said, "are the largest taxpayers in the country. In that capacity they have contributed more than any other interest to the construction and maintenance of the Panama canal, the inland waterways system on the Mississippi and Ohio rivers, and the coastal waterway along the Atlantic seaboard. Yet the railroads alone are singled out from all the other interests in the country as being the only ones debarred by law from using these waterways or participating in any way whatever in their use, directly or indirectly.

"What better means could be conceived for bringing about rail and waterway co-ordination than by not merely permitting, but actually encouraging, the railroads to extend their transportation service beyond the rail heads to the operation of vessels on this waterway? Does it not seem that such a course would insure the public the most complete and rounded out service, with the highest degree of true co-ordination?

"The Pennsylvania Railroad had a long historical background of participation in water transport, up to the time the Panama Canal Act became effective. For many years we operated successfully, and with satisfaction to a very large body of patrons, a fleet of vessels on the Great Lakes. Other railroads operated their fleets, so that the shippers received the full benefits of competition. Were it not for the restrictions of the Panama Canal act, unquestionably our flag, and that of the other railroads, would still be flying on the Great Lakes, and we would be looking forward to utilization of the Atlantic Deeper Waterway, also, when it is sufficiently advanced for extensive commercial traffic.

"To make matters worse, the government has elected to enter into competi-

Continued on Next Left Hand Page



The New

TWIN TIE PLATE

for **Frogs, Crossings, Switches and Guard Rails**

An important advantage of the new Carnegie Twin Tie Plates is their uniform length—one size, one length to fit all locations along the frog, crossing, switch or guard rail. This adaptability to any width eliminates the necessity of carrying in stock the vast assortment of special tie plates required by present practice. Installation is materially simplified by the elimination of selecting and placing of special sizes and punching. The shifting of plate and tie to get spike holes in proper position is avoided.

Longer life of frogs, plates and expensive switch timber, time saved in installation, simplification and reduction of storekeepers' stocks are economies which have been conclusively proved by extensive use of Twin Tie Plates. For complete information, write Carnegie Steel Company, Subsidiary of United States Steel Corporation, Pittsburgh, Pa.

159

CARNEGIE TWIN TIE PLATES

tion with the railroads by operating upon the Warrior and Mississippi rivers an extensive system of barges, with which the railroads are obliged, by the provisions of the Denison Act, to make reduced through rates, thereby short-hauling themselves and cutting their own revenues. The rates charged to shippers using these barge lines, according to the government's own reports, barely meet the out-of-pocket costs of the barge operations. Competent accountants and engineers who have analyzed these operations have reached the conclusion that if the government barge business were required to bear the maintenance costs and the capital charges which a private enterprise would have to pay, it would be seen that the rates currently charged shippers cover less than half the true costs of rendering the service.

"This is not merely unjust. It is unsound, economically and socially. Moreover, it affords certain shippers great discriminatory advantage in rates. To that extent it is undoing the salutary effect of the rigorous laws, whose wisdom no one questions, forbidding the railroads to establish discriminatory rate structures.

"The restrictions of the Panama Canal Act and the Denison Act against the use of water transport, inland and coastwise, by the railroads, are unwarranted, uneconomic, harmful to the country, and undoubtedly constitute one of the greatest of impediments to the healthy and intelligent development of water transport itself. We invite the friends of water transport to join with us in advocating the repeal of these injurious provisions and the removal of these barriers to the free flow of trade and commerce."

Truck Toll Charges at Thirty-Nine Ports

Tariffs issued by the Southern Freight Tariff Bureau, representing the principal railroads of the Southeast, give notice that at 39 railroad terminals, from Norfolk, Va., to Gulfport, Miss., a charge is to be made against motor trucks which use these terminals to carry freight to or from the water front. The rate is five cents per 100 pounds, and it is called a terminal use charge. A clause of the tariff, dealing with traffic between river or bay carriers and established water carriers, exempts from the charge a long list of steamboat companies.

Class Rate Tariffs Filed

Tariffs putting into effect the revised class rates in eastern and western trunk line territory prescribed by the Interstate Commerce Commission last year began arriving at the commission's office last week, in compliance with its orders requiring them to be made effective on December 3 on 45 days' notice. In response to a petition filed by the Great Lakes Transit Corporation and the Minnesota-Atlantic Transit Company, the commission reduced to 30 days the notice to the public required as to the lake-rail rates. Under a plan assented to by the executive committee of the National Industrial Traffic League, copies of the class tariffs are being sent to the shippers by express, charges collect. Correspondence with the committee pointed out that the cost of the tariffs to the eastern trunk lines would run well over $200,000 and that the printing cost for single tariffs ran as high as $5 a copy.

New York Railroad Club Announces Plans for Annual Dinner

The annual dinner of the New York Railroad Club is to be held this year on Thursday, December 17, at the Hotel Commodore, New York, according to a recent announcement. Charles G. Melvin is general chairman of the dinner committee, and J. M. Davis, president of the Delaware Lackawanna & Western, is chairman of the reception committee. H. H. Vreeland, chairman of the club's executive committee, will act as toastmaster at the dinner, while Dr. William Mather Lewis, president of Lafayette College, Easton, Pa., is to be the principal speaker.

The club's second meeting of the 1931-1932 season, designated as "Electrical Night," was held in the auditorium of the Engineering Societies building on Friday, October 16. The program included illustrated addresses by J. C. Hassett, mechanical engineer, New York, New Haven & Hartford, New Haven, Conn., on "The Latest Type of Electrical Locomotive in Use by the New York, New Haven & Hartford—Its Performance Data and Operating Comparisons;" by W. M. Guynes, assistant engineer, transportation department, General Electric Company, Erie, Pa., on "Aspects of the Design of the New Haven Railroad's Latest Electric Locomotive and a Resumé of Progress in the Development of Electric Rolling Stock," and by W. A. Gluesing, General Electric Company, Schenectady, N. Y., on "Adventures in Science."

Competition Among Railways

It is the duty of railway managements to restrict in radical fashion the kind of competition which has been prevalent of late years and bring it within some kind of reasonable limit. A great deal can be done in this direction without invoking assistance from court or commission and much money can be saved.

The railroad industry is not dead nor is it necessarily dying, sick as it is today. But it needs an overhauling of plant, of methods and of ideas, and the first step to convalescence requires that the common interest of the industry shall take precedence at least for a time, of individual interests only too often seen through distorting glasses. The present emergency is in its nature equal to an emergency of war and it should be grappled in the spirit with which men deal with war. It may well be that an opportunity for this spirit to get into action will be offered by the decision of the Interstate Commerce Commission in *ex parte* 103—although no one knows or can know what that decision will be. But if such an opportunity should be offered it is imperatively necessary that it shall be grasped. Failure to grasp it will be equivalent to final default on the part of management.

—Thomas F. Woodlock in the Wall Street Journal.

Club Meetings

The Toronto (Ont.) Railway Club will hold its next meeting at the Royal York Hotel, Toronto, on Monday evening, November 2. J. H. McDiarmid, supervisor of yard operations, Central region, Canadian National, will speak on terminal operation methods. The meeting will be followed by an entertainment.

The Indianapolis (Ind.) Car Inspection Association will hold its next meeting on Monday evening, November 2, at seven o'clock at Hotel Severin, Indianapolis. There will be a paper on reducing repair track movements, by H. R. Rice (N. Y. C. & St. L.), Cleveland, Ohio.

The New England Railroad Club will hold its regular meeting on Tuesday evening, November 10, at the Copley Plaza Hotel, Boston. This will be the annual Canadian night, and H. J. Humphrey, assistant to vice-president, Canadian Pacific, will speak on "A Railway in Nation Building."

Express Rate on Gold Reduced

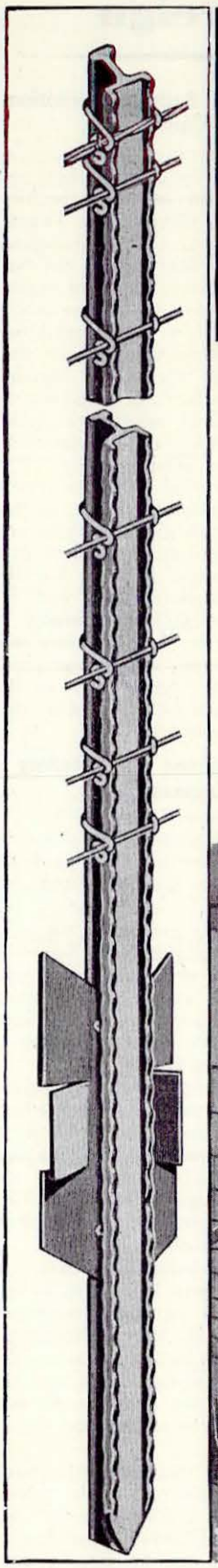
Although the financial news of late has contained many items regarding the export of gold from New York, the Canadian government is also importing gold in such quantities that the Railway Express Agency, Inc., last week asked and obtained from the Interstate Commerce Commission authority to reduce the express rate on gold bullion, when shipped in lots of $1,000,000 or more at a time, to $1.65 per $1,000 from St. John, N. B., to Boston and New York. The former rates were $2 to Boston and $2.35 to New York, via Vanceboro, Me. The application for authority to publish the rate on one day's notice said that due to the exchange situation the Canadian government wished to ship gold from abroad by the most expeditious route, which was that via Vanceboro, and that, in view of the large quantity, it desired to reduce the rate via that route to meet the combination of local rates heretofore available of 30 cents from St. John to Montreal and $1.35 from Montreal to New York. The commission authorized the reduction on five days' notice.

Harriman Memorial Medals

The E. H. Harriman Memorial Medals, awarded annually by the American Museum of Safety, for best railroad safety records, were announced, for the year 1930, at a luncheon given in New York on October 24 by Arthur Williams, president of the museum.

The gold medal, which is given to a

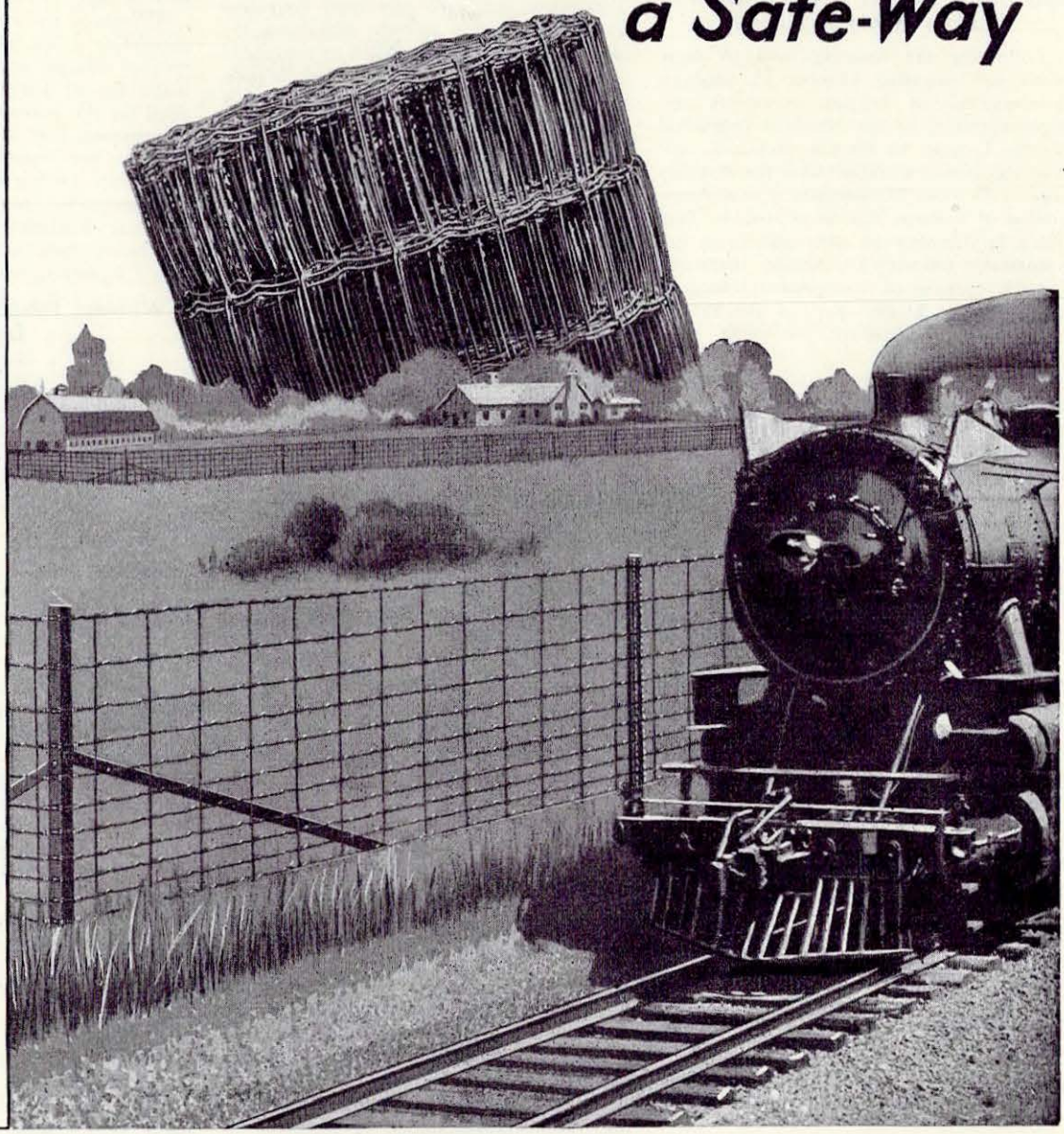
Continued on Next Left Hand Page



AMERICAN Fence and BANNER STEEL POSTS

IT is cheaper to put up a good fence than to pay stock claims. Likewise it is economy to buy adequate protection—proved protection—such as that offered by American Railroad Fence and Banner Steel Line Posts—the post of railroad rail construction. These products including National Expanding Anchor End and Corner Posts meet every specification recommended by the American Railway Engineering Association.

Make Your Right-of-Way- - a Safe-Way



1831 COMMEMORATING 100 YEARS of PROGRESS IN WIRE MAKING 1931

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago SUBSIDIARY OF UNITED STATES STEEL CORPORATION And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

railroad operating ten million or more locomotive miles in the year, went to the Central region of the Pennsylvania; a certificate of honorable mention was awarded to the New York Central Railroad.

The silver medal—railroads operating less than ten million but more than one million locomotive miles—went to the Los Angeles & Salt Lake; a certificate of honorable mention to the Gulf, Mobile & Northern.

The bronze medal—roads operating less than one million locomotive miles—went to the Missouri-Illinois Railroad; a certificate of honorable mention to the New Orleans Great Northern.

In Group D, switching and terminal railroads, the Lake Terminal Railroad received a certificate of merit.

Rail Heads Discuss Competition with Leaders in Motor Industry

Following the meeting held in New York on Thursday, October 15, between a committee of railway presidents and representatives of the National Industrial Traffic League, to discuss proposed railway legislation, as reported in the *Railway Age* of October 17, members of the Association of Railway Executives met in New York on October 16 with leaders in the automobile industry to consider measures for the curbing of unregulated transport competition. At the close of the Friday session the following statement was issued:

"Today's meeting was a continuation of the meeting held in New York late last spring by both groups for the purpose of interchanging ideas as to the general transportation situation.

"Both sides are earnestly endeavoring to find a solution of the present transportation problem and progress was made at the meeting today toward reaching an amicable understanding of the situation faced by both the motor industry and the rail lines."

While no further meetings were announced by those present, it was intimated, according to the New York Journal of Commerce, that nothing in the way of a final decision had been reached and that further consultations would be necessary before the matter was settled.

Those present at the meeting on October 16 were, for the railroads: R. H. Aishton, chairman, advisory committee, Association of Railway Executives; W. R. Cole, president, Louisville & Nashville; L. A. Downs, president, Illinois Central, and J. J. Pelley, president, New York, New Haven & Hartford; and for the motor industry: A. J. Brosseau, president, Mack Truck Company, and T. R. Dahl, vice-president, White Company.

N. E. Railroads Said to Be Interested in New Trans-Atlantic Line

Plans for the formation of the "New England Transoceanic Company," organized with the purpose of buying from the government the airplane carriers "Lexington" and "Saratoga," reconditioning these vessels, and using them in the operation of a new four-day express mail and passenger service between Boston, Mass., and Europe, are receiving careful consideration from transportation and financial leaders in New England, according to a statement made public on October 17 by Laurence R. Wilder, first president of the American Brown Boveri Company, former president of the New York Shipbuilding Corporation, and now adviser to the Boston Port Authority.

All three of the railroads serving Boston—the Boston & Maine, the Boston & Albany, and the New York, New Haven & Hartford—as well as the Pennsylvania, are said to be interested in the new line, while officers of the First National Bank of Boston and of Lee, Higginson & Company are also reported to be identified with the new project. An unofficial statement from one of the roads indicates, however, that while it has been in touch with the situation as a developing idea and has been consulted by those who are actively promoting the plan, it has so far been asked to contribute only observations as to traffic possibilities, etc., and has not committed itself in any way to financial support of the project.

Government Railway System Urged by "Progressives"

Establishment of a government railway system, supplementary to and competitive with the privately owned railroads, under the powers of the federal government to construct or take over public highways, is recommended in a report, made public on October 16, of the committee on public utilities appointed by the "Conference of Progressives" held at Washington in March. The report was signed by Donald R. Richberg, of Chicago, counsel for the railway labor organizations, who was chairman of the committee.

The report declares that the "recapture of public control of all public business, and the elimination of any private monopoly control of public necessities, are the gravest problems that confront the American people today" and that "public competition is the most effective form of regulation." Today, the report says, the bitterest opposition to public control is found in the "field of its greatest effectiveness," and "the railroads complain of competition on publicly-owned waterways and publicly-owned concrete highways." By the establishment of a government railway, the report says, "the transportation service of the nation may be improved and standards of service and of rates may be established, which can be applied in the regulation of private enterprise." Revision of Section 15a of the interstate commerce act is also recommended in order to place future rate regulation "on the basis of service at cost, including a fair return upon actual private investment and not on the basis of fictitious 'values' of property."

The report also recommends that motor transportation should be regulated to the same extent and by the same agencies as steam and electric railroad transportation and that if further consolidations of railroads are to be encouraged the Interstate Commerce Commission should be authorized and required to protect "all interests, including security holders, employees and communities served."

Foreign

Engineering and Railway Exhibition in China

Chiao-tung University is planning an international engineering and railway exhibition, to be held at the university, Zicawei, Shanghai, China, from December 12 to 27, inclusive. Under the auspices of the Ministry of Railways of the National Government, this combined exhibition will be the first of its kind ever held in China. The purpose of the exhibition is to bring before the Chinese public, particularly the people engaged in business and education, the latest developments in engineering, industrial, and scientific products, in railway appliances and equipment, and in methods of administration.

All spaces for exhibit on the university ground or in its buildings will be allotted free of charge, while gas, electricity and water for all demonstrations will be supplied on the university account. For the convenience of manufacturers and industries not represented in Shanghai, a committee of the university faculty will be appointed to receive and arrange products for exhibition. At the close of the exhibition these will be returned or disposed according to instructions.

Wireless Telephone on Switching Engines

[From a Berlin Correspondent]

The use of radio telephone for dispatching switching engines in freight yards on the German State Railroads—and for sending all kinds of communications between the yardmaster's office and the locomotive or the switching crew—has now been in vogue for more than one year, and the facility is said to have proved valuable at seven important stations: Saalfeld, Erfurt, Soest, Hamm, Duisburg-Hochfeld, Essen and Wedau.

Yardmasters, reporting their experience, call the system indispensable. Where two or more switching engines are at work in the same yard, the office keeps in constant touch with all of them, and the keeping of one engine from hindering others has been carried out more satisfactorily than ever before.

Experiments are being made with apparatus to communicate both ways, so that the engineman or switching conductor can acknowledge each order received, thus more fully guarding against errors or delays. Both the sending station and the locomotive have loud speakers so that messages are received without the use of earphones.

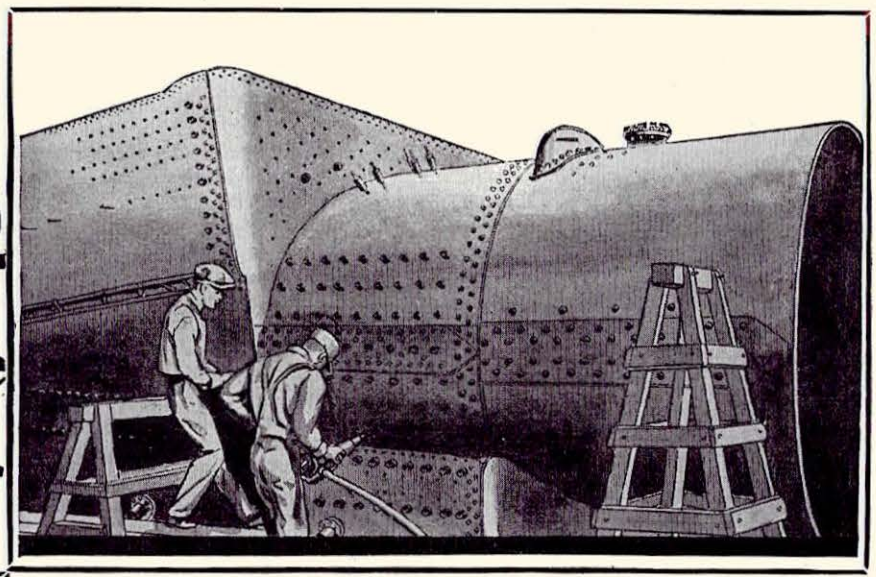
It is said that these communicating systems do not interfere with general broadcasting. The sending apparatus has a range sufficient to cover from four to eight yard tracks, side by side, a wave length of 180 meters being used.

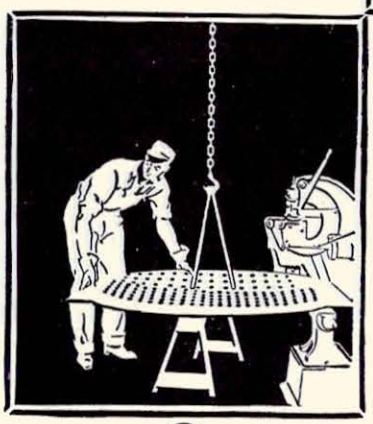
Ultra-short wave apparatus is being tried, with a view to doing away with aerials strung on poles along the tracks.

Wireless apparatus is also being applied to road locomotives with a view to facilitating the quick making up of trains and dispatching them from the yards.

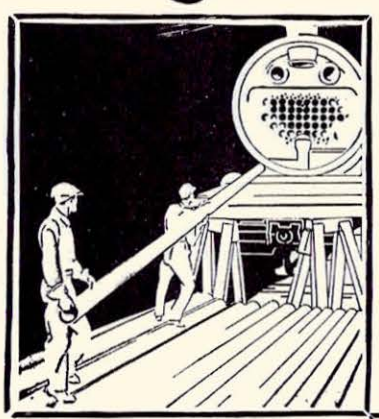
Continued on Next Left Hand Page

Build low maintenance into your boiler





AGATHON NICKEL IRON



● WHAT goes into the boiler today will determine the repair costs a few years hence.

Just as modern design has improved locomotive operation, so, too, modern metallurgy has improved boiler maintenance.

Modern boiler tubes of Toncan Iron, due to their superior resistance to corrosion and their uniform, seamless quality far outlast the old tubes.

Modern staybolts of Agathon Nickel Iron have the increased tensile strength required by present day boiler pressures. They are doubling the mileage per staybolt renewal for progressive railroads.

Firebox sheets of Toncan Iron resist corrosion and fire-cracking. This alloy of refined iron, copper and molybdenum has substantially extended the life of side sheets.

In these and many other instances, Republic metallurgists have developed special alloy irons and steels that are improving locomotive performance and lowering maintenance.

REG. U. S. PAT. OFF. TONCAN COPPER Mo-lyb-den-um IRON

REPUBLIC STEEL CORPORATION

GENERAL OFFICES: YOUNGSTOWN, OHIO

Equipment and Supplies

LOCOMOTIVES

THE LEHIGH VALLEY is inquiring for 20 locomotives of the 4-8-4 type.

FREIGHT CARS

THE CHICAGO & ILLINOIS MIDLAND has ordered 500 composite gondola cars and 250 hopper cars, all of 50 tons' capacity, from the Pullman Car & Manufacturing Corporation.

IRON & STEEL

THE ERIE is expected to enter the market for 35,000 tons of rail.

THE SOUTHERN PACIFIC has ordered 260 tons of structural steel for grade crossing elimination work at San Jose, Cal., from the Moore Dry Dock Company.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 42,000 tons of rail. The inquiry includes about 408 tons of 130-lb. rail, 40,178 tons of 110-lb. rail and 1,414 tons of 90-lb. rail.

THE ST. LOUIS-SAN FRANCISCO has ordered 230 tons of structural steel from the Virginia Bridge & Iron Works and 100 tons from the Mississippi Valley Structural Steel Company.

Supply Trade

George E. Totten, assistant manager of tin plate sales of the **Jones & Laughlin Steel Corporation,** has resigned to become manager of sales of the tin plate division of the **Republic Steel Corporation,** Youngstown, Ohio.

John A. Roche, representative of the **Syntron Company,** Pittsburgh, Pa., has been appointed district representative for the Chicago territory, with headquarters at 1419 Buckingham building, 59 East Van Buren street, Chicago.

The **International-Stacey Corporation,** Columbus, Ohio, has purchased all the stock of the **Stacey Manufacturing Company,** Cincinnati. A short time ago the **International Derrick & Equipment Co.,** Columbus, entered into a re-organization with the **Stacey Engineering Company,** the new organization being known as the International-Stacey Corporation. This re-organization included the **P. H. & F. M. Roots Company** and the **Connersville Blower Company, Inc.,** Connersville, Ind., the **Wilbraham-Green Blower Company,** Pottstown, Pa., and the **Stacey Brothers Gas Construction Company,** Cincinnati.

The Signal Export Association has filed papers under the export trade act (Webb-Pomerene law) with the Federal Trade Commission, for exporting railway signal equipment and other apparatus. The association will maintain offices at 74 Trinity Place, New York City. Officers of the association are: **George A. Blackmore** and **Paul Renshaw,** managers; **Charles M. Muchnic,** secretary, and **B. P. Wayne,** assistant secretary. Members are **Union Switch & Signal Company,** Swissvale, Pa., and **General Railway Signal Company,** New York City. The export trade act grants exemption from the anti-trust laws to an association entered into and solely engaged in export trade, with the provision that there be no restraint of trade within the United States, or restraint of the export trade of any domestic competitor, and with the further prohibition of any agreement, understanding, conspiracy or act which shall enhance or depress prices or substantially lessen competition within the United States or otherwise restrain trade therein.

OBITUARY

Lee W. Barber, president of the Standard Car Truck Company, Chicago, died at Monrovia, Cal., on October 19, after a brief illness. Mr. Barber had been associated with this company for about 35 years. He was born on June 12, 1874, at Sedalia, Mo., and took up the study of medicine at the University of Minnesota. After being forced to relinquish his studies because of ill health, Mr. Barber entered the service of the

Lee W. Barber

Standard Car Truck Company as an inspector of equipment. He was promoted successively through various positions, including that of secretary and assistant treasurer, being elected president in 1920, which position he held continuously until his death.

Charles L. Heisler of the engineering general department of the General Electric Company, Schenectady, N. Y., died at his summer home at Rock City Falls, near Saratoga, N. Y., on October 13. Mr. Heisler was born on February 22, 1863, at Wapakoneta, Ohio, and was graduated from Cornell University in 1890, with the degree of M. E. Mr. Heisler first served with the Brooks Locomotive Works, Dunkirk, N. Y., and subsequently with the Dunkirk Engineering Company. While with the latter organization he developed the Heisler type of geared locomotive, the manufacture of which was taken over by the Baldwin Locomotive Works and later by a group of business men of Erie, Pa. He was also with Bement, Miles & Company, where he developed a high duty reciprocating pumping engine which was manufactured by the Heisler Pumping Engine Company, of which he was vice-president and chief engineer until 1907, when the plant was discontinued. He then became connected with the American Locomotive Company as a member of its staff of mechanical engineers, and at a later period served as mechanical engineer of the Washington Steel & Ordnance plant. He joined the General Electric organization in 1922, and was in charge of the mechanical engineering branch of the general superintendent's office. From 1926 until the time of his death he was in the engineering general department. Among his principal inventions, in addition to the Heisler geared locomotive, were various types of pumping engines and machinery, steam road rollers, barometric condensers and the wet type vacuum pump. He had been granted 21 patents since joining the staff of the General Electric Company.

Thomas A. Edison

The death of Thomas A. Edison at his home in West Orange, N. J., on October 18, brought to a close the career of one of the most remarkable characters in history. His particular genius consisted of carrying existing discoveries to the point where they could be converted into practicable devices. Combined with this he possessed the ability and energy to convince a skeptical public that it could profit by the use of his inventions.

More than a thousand inventions have been credited to him, those which are probably of greatest importance being the perfection of the incandescent lamp and the development of a power system to supply it, followed by the creation of a demand for these developments. Other products of his genius and energy which are of special importance to the railroad industry are the Edison storage battery, the Edison primary battery, the telephone microphone, multiplex telegraphy and his influence on the early development of electric traction. Many other achievements can also be credited to him, but, generally speaking, probably the most important result of his work has been to take inventions out of the field of magic and establish them as a vital part of social progress.

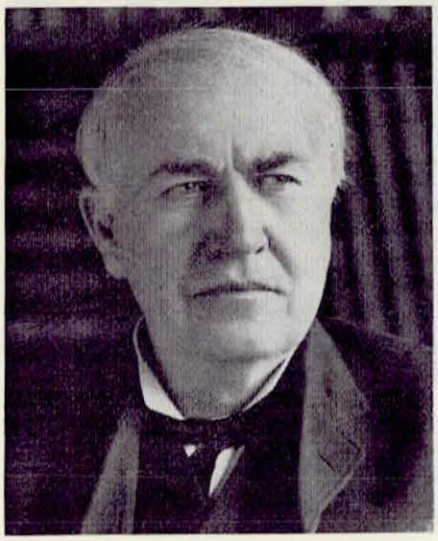
Mr. Edison was born in Milan, Ohio, on February 11, 1847, and in 1854 his family moved to Port Huron, Mich., where he received most of his early education from his mother, who inculcated in him a love for reading. At the age of eleven he became a newsboy on the Grand Trunk Railway, and for a short time during the early years of the Civil war published a little newspaper with a circulation of 500, which he called "The Weekly Herald." This venture was terminated after the publication of 40

Continued on Next Left Hand Page

BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

issues, by a fire in the baggage car in which he had been permitted to do his printing. Mr. Edison then entered the field of telegraphy, which he had learned from the station master at Mount Clemens, Mich., and obtained a position as night operator at Port Huron. In 1864, while working in Indianapolis, Ind., he perfected his first important invention, that of a repeating instrument which enabled a message to be transmitted automatically on a second line, without the presence of an operator. His first patent was for a chemical vote recorder. In 1871, he went to New York, where he associated himself with the Gold and Stock Exchange Telegraph Company, where he made many improvements to the stock ticker and other appliances.



Thomas Alva Edison

Selling out his rights on these devices, he established a factory and laboratory in Newark, N. J., where he carried out a contract with the Western Union Company and where he developed his greatest contribution to telegraphy—the quadruplex system of using the wires. In 1876, Mr. Edison gave up his manufacturing enterprises and established his laboratory at Menlo Park, N. J. It was here that the carbon filament electric lamp was developed in 1879. The phonograph followed, and it was at this time that he also attempted to create a satisfactory electric locomotive. In 1886, the laboratory and factory were established in Orange, N. J., where in 1887 the kinetoscope, or motion picture machine, was produced. Numerous other inventions were later developed here which have since found wide acceptance as manufactured articles.

COALING STATION GATE.—Roberts & Schaefer Company, Chicago, has issued an eight-page folder, featuring the "Side Cut, Non-Skim" coaling gate developed by that company. Diagrams illustrate its operation and several photographs portray installations now in service. Two pages are devoted to the "N and W" type of combined engine coaler and cinder plant and the "Beamer" sand dryer.

Construction

ATCHISON, TOPEKA & SANTA FE.—Two contracts have been awarded to the Sharpe & Fellows Contracting Co., Los Angeles, Cal., one covering the grading for a spur track two miles long to reach a gypsum mine at Sun City, Kan., and the other for the construction of two concrete abutments for bridge 674-A near Hebron, N. M.

CHESAPEAKE & OHIO.—This company received bids on October 12 for the extension of center sidings at Garrison, Ky., and Stony Point, at estimated costs of $56,700 and $35,600, respectively.

DEL RIO & NORTHERN.—This company, recently incorporated in Texas, has applied to the Interstate Commerce Commission for authority to build a line from Del Rio to Sonora and from Del Rio to Quemado, 132 miles in all, financing the cost by an issue of bonds.

DELAWARE & HUDSON.—The Public Service Commission of New York has designated for elimination the Bridge street crossing of this company's tracks, located on the Windsor-Deposit state highway, Windsor, N. Y., and has also ordered the elimination of the railroad's Windsor crossing, one mile south of Rouses Point station, Champlain, N. Y. In both cases separation of grades will be accomplished by depressing the highways and carrying them under the railway tracks at points near the present crossings.

HOOVER DAM.—Six Companies, Inc., Boulder City, Nev., general contractors on the construction of the Hoover Dam on the Colorado river, have awarded a contract to Shannahan Bros., Inc., Los Angeles, Cal., for the laying of 16½ miles of construction tracks at the dam site. The contract covering the grading on this line was awarded several months ago, as reported in the *Railway Age* of June 27.

NEW YORK, CHICAGO & ST. LOUIS.—Construction work has been commenced on this road's project for a new line extending from Maumee, Ohio, to an intersection with the Wabash at Toledo, and the abandonment of the existing line. This work involves the construction of approximately 7.4 miles of main track and 5.4 miles of yard and interchange tracks, together with four highway subways. A total of about 90,000 cu. yd. of excavation are involved, while the entire cost of the project will be more than $1,000,000. Contracts for the subways and for a portion of the grading have been awarded. The track work is to be done by company forces.

SOUTHERN PACIFIC.—This road contemplates the construction, at Fresno, Cal., of a subway to carry Belmont avenue under its tracks, at a cost of about $210,000.

Financial

ATCHISON, TOPEKA & SANTA FE.—*Bond.*—The Interstate Commerce Commission has authorized the Elkhart & Santa Fe to issue a registered first mortgage 6 per cent, series B, bond for $2,000,000 to be delivered to the Atchison, Topeka & Santa Fe in satisfaction of indebtedness.

CHESAPEAKE & OHIO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue nominally $28,142,000 of refunding and improvement mortgage 4½ per cent bonds, to refund a like amount of first lien and refunding mortgage 20-year 5 per cent bonds, and to be pledged as collateral for short-term notes.

CHICAGO & NORTH WESTERN.—*Bonds.*—This company has been authorized to issue $8,380,000 of general mortgage 4½ per cent bonds of 1987 and $16,456,000 of first and refunding mortgage bonds, series C, to be pledged and repledged as collateral security for short term notes.

CHICAGO, BURLINGTON & QUINCY.—*Trackage Rights and Abandonment.*—The Interstate Commerce Commission has authorized this company to operate under trackage rights over the Chicago, Rock Island & Pacific between Beatrice, Neb., and Rockford, 8.4 miles, and to use jointly with the Rock Island the latter's station building at Rockford. The Burlington is permitted to abandon its own line between these points and the two roads are authorized to construct two short connecting tracks.

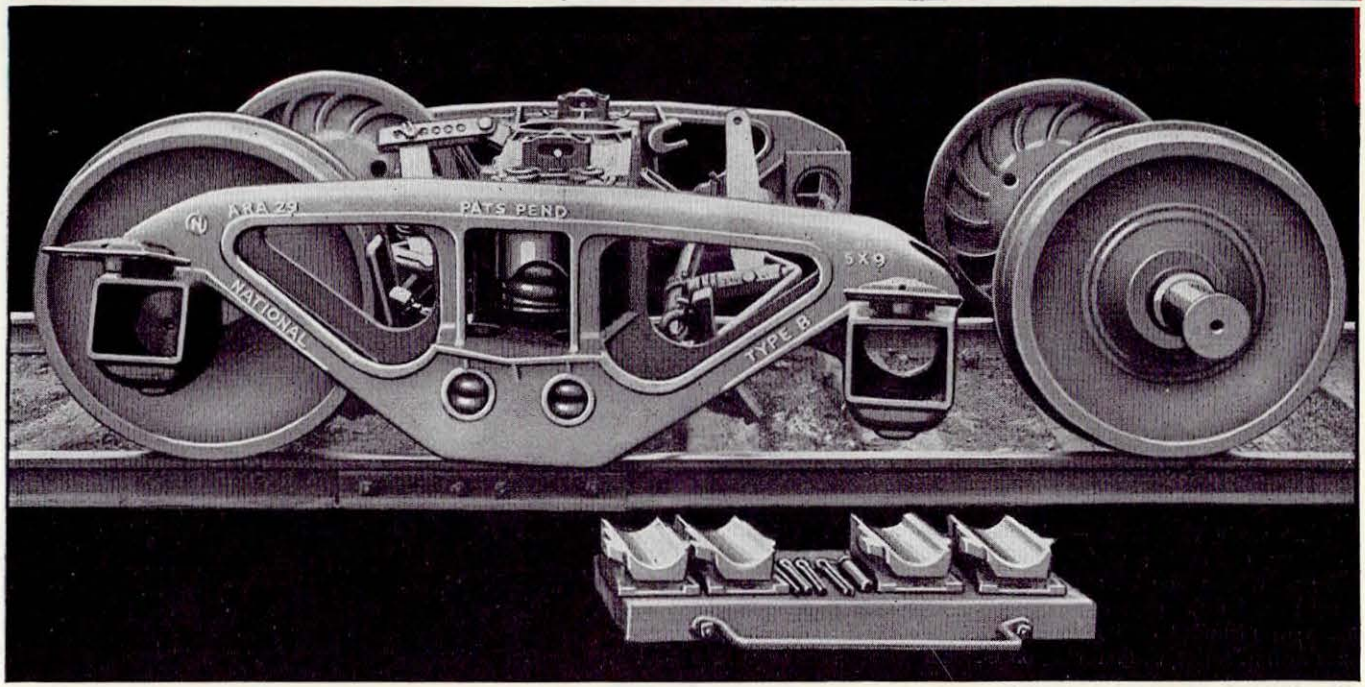
CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $538,000 of first and general mortgage 6 per cent bonds, series B, to be pledged and repledged as collateral security for short term notes.

FLORIDA EAST COAST.—*Receivers' Certificates.*—The receivers have applied to the Interstate Commerce Commission for authority to issue $550,000 of six months receivers' certificates, at 4½ per cent, to be purchased by the Florida East Coast Car Ferry Company. The proceeds are to be used to pay the semi-annual interest due December 1 on the first mortgage bonds and to meet the deficit of $276,815 which has accrued since September 1.

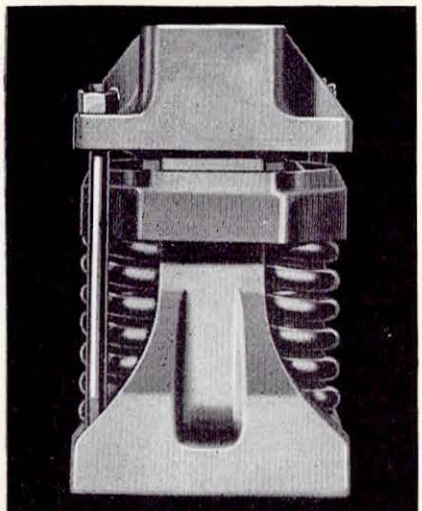
GULF, MOBILE & NORTHERN.—*E. P. Bracken Asks Authority to Serve As Director.*—E. P. Bracken, executive vice-president of the Chicago, Burlington & Quincy, has applied to the Interstate Commerce Commission for authority to serve also as a director of the Gulf, Mobile & Northern and the New Orleans Great Northern, in which the Burlington has a minority interest, and in which it joins in through routes from the Mississippi Valley territory to New Orleans and Mobile. The G. M. & N. and the N. O. G. N. are assigned in the commission's consolidation plan to the Atlantic Coast Line system, while the Burlington is made the nucleus of a separate western system.

Continued on Next Left Hand Page

TRUCKS ››› *that Speed Train Operation*



QUICK WHEEL CHANGE SAVES TIME AND MONEY



M17
National Draft Gear
Another contribution by National to profitable freight operation. This gear stands first in the combination of capacity, sturdiness and endurance.

NATIONAL Type B trucks are designed so that wheel changes can be made quickly at a saving in both time and cost. ›› On removal of the journal bearings, wedges and the brake hanger fastenings, side frames are spread apart, old wheels are rolled out and new ones rolled in. ›› No other parts are disturbed. ›› This is only one of a large number of important advantages of National Type B trucks, all secured without any premium in cost.

Details gladly furnished on request.

THE NATIONAL MALLEABLE & STEEL CASTINGS CO.
General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Washington, Chicago, St. Louis, San Francisco
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

NATIONAL TYPE M&S ··B·· TRUCKS

The commission recently issued a ruling indicating an intention to prevent interlocking interests between railroads in different systems. Mr. Bracken was elected a director on October 15. Last Spring E. N. Brown, chairman of the St. Louis-San Francisco, was elected a director of the G. M. & N., and applied for authority to serve but later withdrew the application upon receipt of a letter from Oliver E. Sweet, director of the commission's Bureau of Finance, expressing the opinion that the commission would not approve the application on the ground of the competition between the Frisco and the G. M. & N.

ROSCOE, SNYDER & PACIFIC.—*Stock.*—The Interstate Commerce Commission has authorized this company to issue $200,000 of 6 per cent preferred stock to be delivered pro rata to the holders of its common stock, and, for the conversion of the preferred stock, to issue $200,000 of common stock.

SEABOARD AIR LINE.—*Defaults on Equipment Trust Certificates.*—The receivers of this line have found it necessary to defer the payment on the installment of principal on its equipment trust certificates, series U, maturing on October 15. Interest payments continue.

TEXAS & NEW ORLEANS.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon operation of that part of its Beaumont-Sabine branch extending from West Port Arthur, Tex., for approximately 2 miles and to abandon that part of its branch extending from the last point to Sabine, 10.2 miles. The abandonment of the last is made necessary by highway competition and the fact that the government will sever it by the construction of an intercoastal canal.

Dividends Declared

Cuba Railroad.—Preferred, 1½ per cent, quarterly, payable November 2 to holders of record October 26.

Maine Central.—Preferred, 1¼ per cent, quarterly, payable December 1 to holders of record November 16.

New Orleans, Texas & Mexico.—1¾ per cent, quarterly, payable November 30 to holders of record November 13.

Average Prices of Stocks and of Bonds

	Oct. 20	Last week	Last year
Average price of 20 representative railway stocks..	51.54	47.50	96.78
Average price of 20 representative railway bonds..	77.13	79.03	94.78

THE PUBLIC SERVICE COMMISSION OF NEW YORK is to hold a hearing at its office in Albany, on October 27, to consider the question of elimination of grade crossings in the year 1932 under the three-hundred-million-dollar state appropriation. The commission has prepared a list of 126 crossings which "it has been suggested" should be considered for elimination during the year, and this hearing is for the purpose of deciding how many of the suggestions shall be accepted, to the extent of including the crossings in the formal list of work to be done. The railroads and the counties are expected to appear and express their intentions as to particular crossings.

Railway Officers

FINANCIAL, LEGAL AND ACCOUNTING

J. J. Danhof, whose appointment as general counsel of the Michigan Central, with headquarters at Detroit, Mich., was noted in the *Railway Age* for October 3, has been connected with this road in a legal capacity for about 18 years. He was born at Grand Haven, Mich., on July 15, 1884, and was admitted to the bar in Michigan in 1912. He then practiced law with the firm of Campbell, Bulkley & Ledyard of Detroit, becoming an attorney for the Michigan Central in March, 1913. In December, 1918, Mr. Danhof was appointed solicitor with the United States Railroad Administration, in which position he had jurisdiction over the legal affairs of the Michigan Central and the Chicago, Kalamazoo & Saginaw (part of the Michigan Central). After the termination of government control of the railroads in March, 1920, Mr. Danhof retained his connection with the Michigan Central, being appointed assistant general attorney two years later. He was appointed general attorney, with headquarters at Detroit, in 1930, which position he held until his recent appointment. Since February, 1917, Mr. Danhof has also been counsel for the Detroit Terminal Railroad.

J. J. Danhof

OPERATING

C. F. Dougherty, superintendent of the Louisiana division of the Missouri Pacific, with headquarters at Monroe, La., has had his jurisdiction extended to include the Little Rock division. **H. E. Roll,** superintendent of the Little Rock division, has been appointed assistant superintendent on the same division, with headquarters as before at McGehee, Ark.

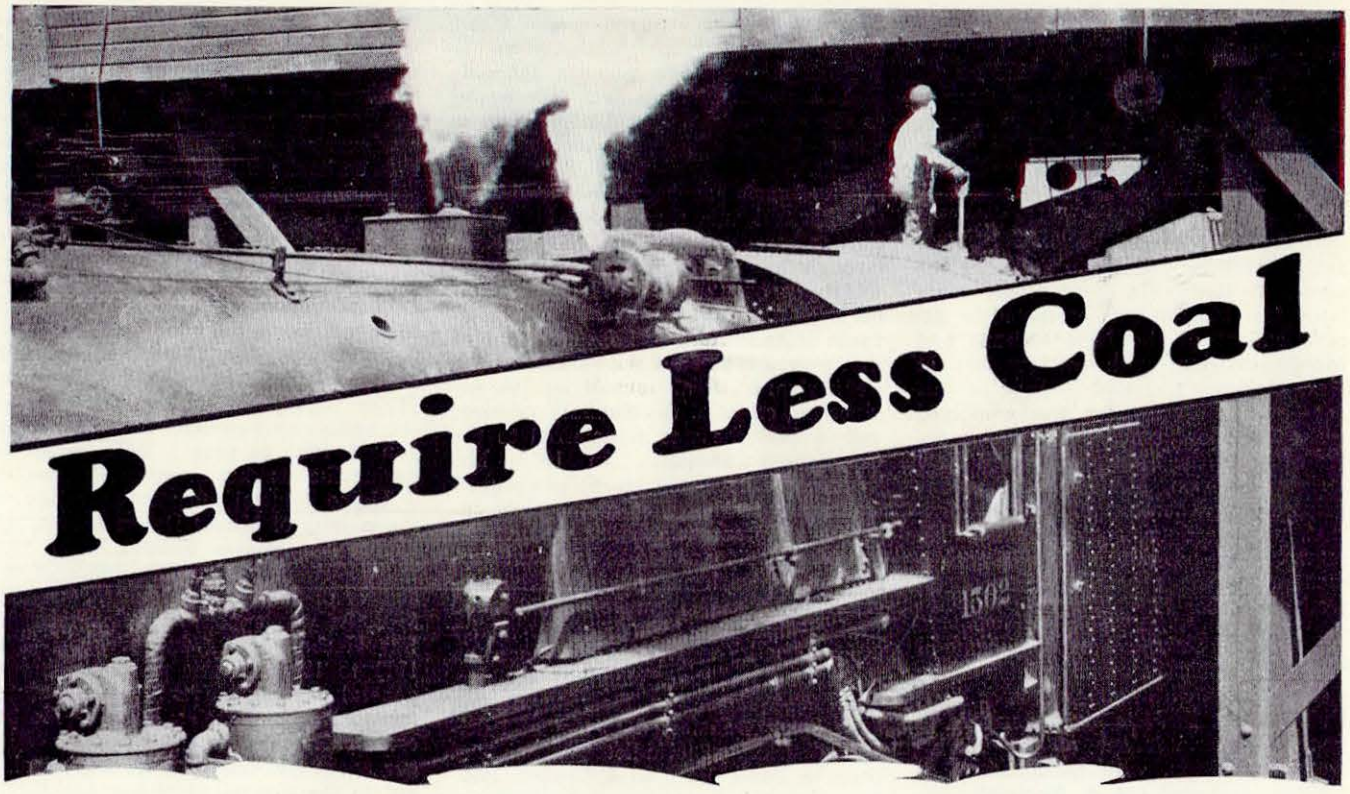
Effective October 15, the jurisdiction of **T. J. Quigley,** general superintendent of the Southern Lines of the Illinois Central and the Gulf & Ship Island (part of the Illinois Central), with headquarters at New Orleans, La., was extended to include the Yazoo & Mississippi Valley (also part of the Illinois Central). **E. D. Holcomb,** general superintendent of the Yazoo & Mississippi Valley, with headquarters at Memphis, Tenn., has been appointed superintendent of the newly-created Vicksburg division, which has been formed by combining the New Orleans and Vicksburg Route divisions. Mr. Holcomb's new headquarters are at Vicksburg, Miss. **J. M. Chandler,** superintendent of the Vicksburg Route division, with headquarters at Vicksburg, has been appointed trainmaster, with headquarters at the same point, succeeding **S. F. Lynch,** who has been assigned to other duties. **J. F. Walker,** superintendent of the New Orleans division, has been appointed assistant superintendent of the Vicksburg division, with headquarters as before at Baton Rouge, La.

L. L. Morton, superintendent of the Montgomery and New Orleans division of the Louisville & Nashville, with headquarters at Mobile, Ala., has been promoted to assistant general manager, with headquarters at Louisville, Ky., to fill the position left vacant by the appointment of **William E. Smith** as general manager early this year, as noted in the *Railway Age* for January 24. **H. P. Hearon,** assistant superintendent on the Montgomery and New Orleans division, with headquarters at Mobile, Ala., has been promoted to superintendent, with the same headquarters, to replace Mr. Morton. The position of assistant superintendent at Mobile has been abolished.

Mr. Morton is an engineer by training and experience. He was born on April 2, 1884, at Mt. Eden, Ky., and was graduated from Centre College in 1905, with a degree in civil engineering. He entered railway service in June, 1906, in the engineering department of the Atlanta, Birmingham & Atlantic (now the Atlanta, Birmingham & Coast). He left

L. L. Morton

Continued on Next Left Hand Page



Require Less Coal

OPERATING ECONOMY

WHEN one considers that a tiny lump of bituminous coal weighing one and two-thirds ounces will haul one gross ton one mile, it must be admitted that railroads are doing their best to furnish the public with low cost transportation.

The use of HUNT-SPILLER *Air Furnace* GUN IRON wearing parts in the valves and cylinders has played a big part in this remarkable achievement.

The resistance of HUNT-SPILLER *Air Furnace* GUN IRON to frictional wear and high superheat temperatures insures steam tight valves and cylinders—one of the most important factors in every railroad's fuel economy program.

Are all your locomotives equipped?

HUNT-SPILLER MFG. CORPORATION
J. G. Platt, Pres. & Gen. Mgr. V. W. Ellet, Vice-President

Office & Works
383 Dorchester Ave. South Boston, 27, Mass.

Canadian Representative: Joseph Robb & Co., Ltd., 997 Aqueduct St., Montreal, P. Q.
Export Agent for Latin America:
International Rwy. Supply Co., 30 Church Street, New York, N. Y.

HSGI
Reg. U. S. Trade Mark

Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished for Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER GUN IRON

Air Furnace

this road in 1909, to become an assistant engineer on the Kansas City Southern at Texarkana, Tex., and in 1912 he accepted a similar position in the office of the chief engineer of the Louisville & Nashville. During the World War, Mr. Morton served successively in the United States Army as captain, major and lieutenant-colonel of engineers. He returned to the service of the L. & N. in 1919, and in 1920 he was made a special engineer at Louisville, Ky. Eight years later, Mr. Morton was promoted to superintendent of the New Orleans and Mobile division, with headquarters at New Orleans, La., and in June of this year, when this division was combined with the Montgomery division, under the name of the Montgomery and New Orleans division, Mr. Morton was appointed superintendent of the new division, with headquarters at Mobile. He retained this position until his appointment as assistant general manager, effective October 15.

Raymond Swenk, superintendent of the Philadelphia Terminal division of the Pennsylvania, with headquarters at West Philadelphia, Pa., has been promoted to general superintendent of the Northwestern division, with headquarters at Chicago, succeeding **J. A. Appleton,** who has been transferred to the Lake division, with headquarters at Cleveland, Ohio. Mr. Appleton succeeds **P. L. Grove** who has been appointed assistant to the general manager of the Central region, with headquarters at Pittsburgh, Pa. **F. W. Stoops,** freight trainmaster on the Middle division, has been promoted to superintendent of the Toledo division, with headquarters at Toledo, Ohio, succeeding **C. F. Lingenfelter,** who has been transferred to the Columbus

Raymond Swenk

division, with headquarters at Columbus, Ohio. Mr. Lingenfelter replaces **J. F. Henry,** who has been transferred to the Long Island, with headquarters at Jamaica, Long Island, N. Y., succeeding **F. R. Gerard,** who has been transferred to the Philadelphia division, at Harrisburg, Pa. Mr. Gerard relieves **J. B. Phelan,** who has been transferred to the Middle division, with headquarters at Altoona, Pa., to replace **I. B. Sinclair,** who has been transferred to the Pittsburgh division, with headquarters at Pittsburgh, Pa. Mr. Sinclair succeeds **F. L. Dobson,** who has been transferred to the Philadelphia Terminal division at West Philadelphia, to succeed Mr. Swenk.

Mr. Swenk has been associated with the Pennsylvania throughout his entire railway career of 24 years, having risen through the engineering department. He was born on January 3, 1886, at Sunbury, Pa., and graduated from Pennsylvania State College in 1907. In June of that year, he entered the service of the Pennsylvania as a rodman on the engineering corps of the Sunbury division, and in 1909, he was transferred to the Conemaugh division. In 1913, Mr. Swenk was advanced to the position of transitman in the office of the chief engineer maintenance of way, and a year later, he was promoted to assistant supervisor, in which position he served successively on the Delaware, Atlantic and Philadelphia Terminal divisions. After four years, he was further advanced to supervisor on the Schuylkill division, with headquarters at Norristown, Pa., later being transferred to the Philadelphia division, at Middletown, Pa., and then to Paoli, Pa. In February, 1927, Mr. Swenk was promoted to engineer maintenance of way of the Southern division, with headquarters at Wilmington, Del. He was transferred to the operating department in June, 1928, as division superintendent at New Castle, Pa., being transferred in June, 1929, to the Cleveland division, with headquarters at Cleveland, Ohio. In January, 1931, Mr. Swenk was transferred to the Philadelphia Terminal division, with headquarters at West Philadelphia, where he was located at the time of his recent promotion to general superintendent.

TRAFFIC

Edwin P. Bates, assistant freight traffic manager of the Pennsylvania, retired on October 1, after completing 49 years and six months of service with that road. He was born on September 19, 1861, in Allegheny County, Pa., and received his education at Beaver College. Mr. Bates entered railway service in 1882, as clerk to the assistant general freight agent of the Pennsylvania Company (now the Pennsylvania). From 1884 to 1886, he served as clerk in the general freight office of the Allegheny Valley (now the Pennsylvania). In 1886, he was promoted to chief clerk to general freight agent, and in 1887, to special agent. From February, 1891, until July, 1900, he was general freight agent. On August 1, 1900, he was appointed division freight agent of the Buffalo and Allegheny Valley division of the P. R. R., with headquarters at Pittsburgh, Pa. Mr. Bates was appointed general freight agent of the lines east of Pittsburgh on July 1, 1903, and in May, 1912, upon a change in organization, he was promoted to assistant freight traffic manager. He held the same position on the P. R. R. eastern lines under the United States Railroad Administration, and, upon termination of Federal Control, was appointed assistant freight traffic manager, Pennsylvania System, with headquarters at Philadelphia, the position he held until his retirement.

Joseph J. Doane, who was recently appointed general passenger agent of the Maine Central, with headquarters at Portland, Me., was born on July 31, 1878, at Vinal Haven, Me., and received his education in the public schools of his native town. Mr. Doane entered railroad service on June 1, 1900, with the Maine Central, as clerk in the office of the auditor of passenger accounts. From June 1, 1902, to June 1, 1906, he served during the summer months as purser on a Maine Central steamer operating in the vicinity of Mount Desert Island, and during the winter months from 1902 until 1911, as clerk in the office of the auditor of passenger accounts. In June, 1906, he was appointed ticket agent at Bar Harbor, Me., (summer), and from 1911 to 1913, he was employed in the general passenger agent's office (winter months). On October 16, 1913, he became chief clerk to the general passenger agent and on April 17, 1917, assistant to the general passenger agent. In June of this year he was appointed acting general passenger agent, and, on October 1, general passenger agent.

J. F. Harris, whose appointment as assistant traffic manager on the Missouri Pacific, at Denver, Colo., was announced in the *Railway Age* of September 26, has been engaged in railway and commercial traffic work for 30 years. He was born on August 4, 1885, at Mt. Pleasant, Tex., and after a high school education entered railway service on

J. F. Harris

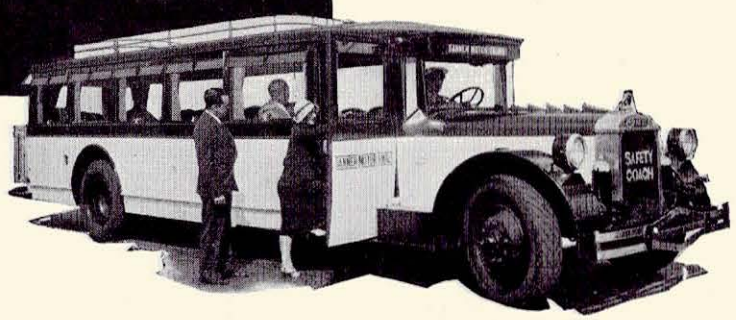
August 1, 1901, in the traffic department of the Kansas City Southern, at Texarkana, Tex. For the next eight years he served as office boy, stenographer and tariff clerk at this point and then at Kansas City, Mo. On March 1, 1909, Mr. Harris went with the St. Louis, Iron Mountain & Southern (now part of the Missouri Pacific), as a stenographer at St. Louis, Mo. He served in this capacity and as chief clerk to the general

Continued on Next Left Hand Page

"GOODYEAR TIRES ARE THE ONLY TIRES TO USE IN OUR TYPE OF SERVICE"

—*says* **Tanner Motor Tours**

Forty coaches comprise the sightseeing fleet of Tanner Motor Tours, Los Angeles, California. For 5 years, they have used Goodyear Tires exclusively



"WHERE distances are great and safety must be combined with dependable performance . . . Goodyear Tires are the only tires for our type of service." *These statements are taken straight from a letter written by Tanner Motor Tours.* "In your All-Weather Tread we get sure-footed safety that is so important, particularly over mountain roads. The Supertwist cord, too, gives extra resilience and vitality so that delays in our schedules have been practically unknown. That is why, for the past five years, we have been using Goodyear Tires exclusively."

Isn't that a good reason why your fleet also should be on Goodyears?

THE GREATEST NAME IN RUBBER

GOODYEAR

IT PAYS TO SPECIFY GOODYEARS WHEN YOU ORDER NEW COACHES

freight agent until January 1, 1913, when he was appointed assistant general freight agent of the St. L. I. M. & S., with headquarters still at St. Louis. He left railway service on May 1, 1919, to become traffic manager for the Teuton Corn & Fruit Products Co., St. Louis, but returned to railway work on July 1, 1923, as assistant to the vice-president, traffic, of the Missouri Pacific, with headquarters at St. Louis. Mr. Harris retained the latter position until his recent appointment as assistant traffic manager.

ENGINEERING AND SIGNALING

E. L. Crugar, who has been appointed chief engineer of the Wabash, as noted in the *Railway Age* for October 17, goes to this road from the Illinois Central with more than 29 years experience in railway engineering to his credit. Mr. Crugar was born on November 4, 1879, at Saline City, Mo., and was educated at Pritchett College and the University of Wisconsin. During vacations he served as a chainman and later as a rodman and masonry inspector on the Chicago & Alton. In April, 1902, he was appointed chief clerk to the chief engineer of the Knoxville, Lafollette & Jellico (now part of the Louisville & Nashville), and until March, 1906, he served in this position and as resident engineer and assistant engineer on the same road. On the latter date, Mr. Crugar returned to the Chicago & Alton as chief clerk to the chief engineer, being appointed assistant engineer in charge of construction two years later. After two years in this position, he was further promoted to assistant chief engineer, with headquarters at Chicago. He left the service of the C. & A. in April, 1914, to accept a position as assistant engineer on the Illinois Central, being promoted to district engineer, with headquarters at New Orleans, La., in December, 1915. Mr. Crugar held this position until the early part of 1923, when he was promoted to engineer of construction, at Chicago, which position he retained until his recent appointment as chief engineer of the Wabash, effective October 16.

E. L. Crugar

John L. Campbell, chief engineer of the Northwestern Pacific (a subsidiary of the Southern Pacific), with headquarters at San Francisco, Cal., has retired from active service. He has been succeeded by **W. H. Kirkbride**, engineer maintenance of way and structures of the Southern Pacific, Pacific Lines, with office at San Francisco, who has been appointed chief engineer of the Northwestern Pacific in addition to his present duties.

Of his engineering career of 43 years, Mr. Campbell has spent about 37 years in railway work. He was born in Illinois in 1863, and when 25 years of age he went to El Paso, Tex., where he began civil engineering as a surveyor in Western Texas and New Mexico. After several years of miscellaneous engineering work, Mr. Campbell was appointed engineer of construction on the Rio Grande Northern (operation discontinued) in 1895, and, in 1896, he became locating engineer of the Rio Grande, Sierra Madre & Pacific (now the Mexico North Western). In 1897, he became chief engineer on location and construction of the El Paso & Northeastern (now part of the Southern Pacific), subsequently going with the Atchison, Topeka & Santa Fe and the Arizona & New Mexico (now part of the Southern Pacific). He was chief engineer of the St. Louis, Kansas City & Colorado (now part of the Chicago, Rock Island & Pacific), during its construction between St. Louis, Mo., and Kansas City. From August, 1904, until early in 1905, Mr. Campbell was engaged on a survey for the Phelps-Dodge Corporation, New York, for the construction of a railway from El Paso to a coal field in the San Juan River valley. In the latter year he was appointed engineer maintenance of way of the El Paso & Southwestern, being appointed chief engineer in 1919. Following the consolidation of this road with the Southern Pacific in November, 1924, Mr. Campbell was appointed assistant to the chief engineer of the latter road, with headquarters at San Francisco, being assigned to valuation work. On October 26, 1928, he was appointed acting chief engineer of the Northwestern Pacific with headquarters at the same point. About a month later, he was appointed chief engineer, which position he retained until his retirement. Mr. Campbell has been active in the work of the American Railway Engineering Association for many years and served as its president in 1922-23.

John L. Campbell

MECHANICAL

W. E. Campbell, general car foreman on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Milwaukee, Wis., has been promoted to district master car builder on the Western Lines, with headquarters at Tacoma, Wash., a newly-created position. **M. L. Hynes**, general car foreman at Green Bay, Wis., has been transferred to Milwaukee, to succeeed Mr. Campbell. **E. F. Palmer**, general car foreman, with headquarters at Sioux City, Iowa, has been transferred to Green Bay, to succeed Mr. Hynes. **F. A. Shoulty** has been appointed general car foreman at Sioux City, to succeed Mr. Palmer.

OBITUARY

John H. McDermott, assistant district superintendent of the Pullman Company, with headquarters at New York, died on October 19 of heart disease at his home in New York. Mr. McDermott was born in 1884, at Hudson, Mass. He had been in the employ of the Pullman Company for 29 years.

W. Chester Webb, traffic manager of the express department of the Canadian National, with headquarters at Montreal, Que., died suddenly on October 17, at his home in Montreal. Mr. Webb was born at Wausau, Wis., in 1883, and began his career as a driver for the United States Express in December, 1901. He resigned from this company in 1914, to join the Canadian Northern Express at Winnipeg, Man., as a clerk, and held various positions until his appointment, in 1928, as traffic manager of the express department of the C. N. R., with jurisdiction over tariff, classification and claim matters.

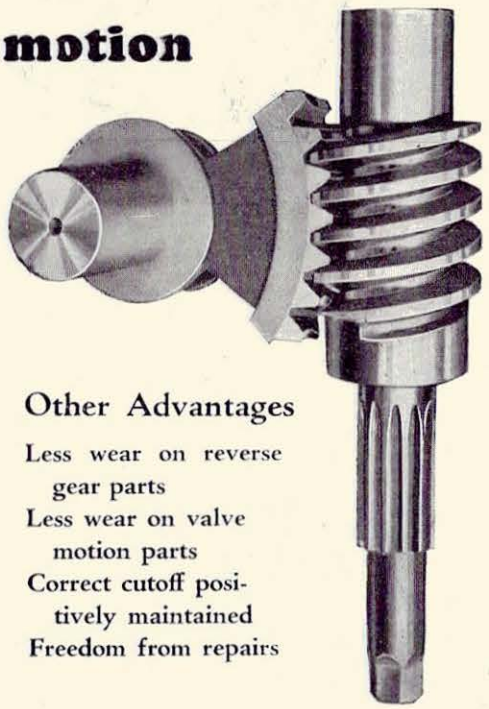
W. Chester Webb

With the BARCO Power Reverse Gear—

The quadrant lever absolutely controls the valve motion

BECAUSE

the worm gear is irreversible and absorbs all of the shock of the valve motion without moving



Other Advantages

- Less wear on reverse gear parts
- Less wear on valve motion parts
- Correct cutoff positively maintained
- Freedom from repairs

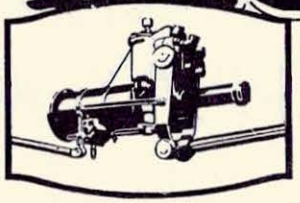
Other Barco Devices

- Barco Steam Heat Connections
- Barco Flexible Joints
- Barco Lubricated Plug Valves
- Barco Automatic Smoke Box, Blower Fittings
- Cleveland Float Low Water Alarm

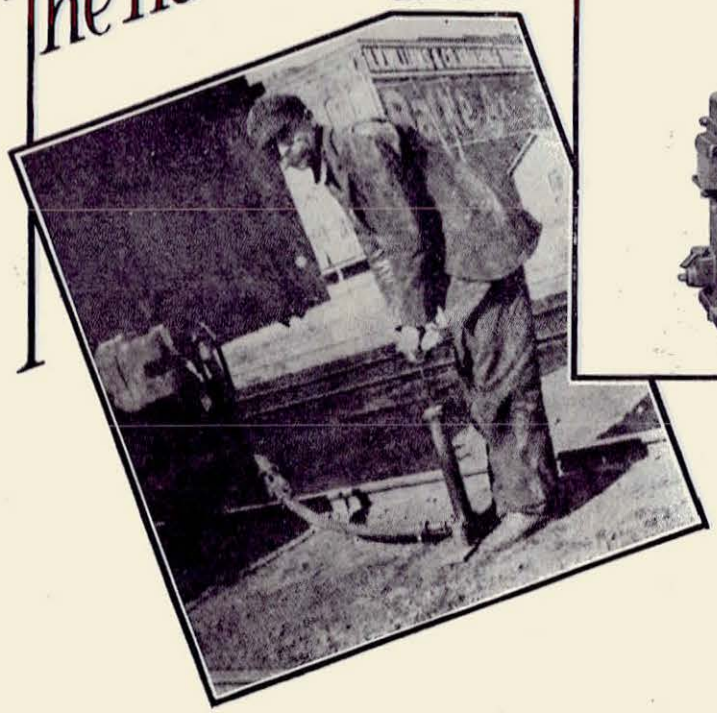
Barco Manufacturing Co.
1801 Winnemac Avenue
Chicago, Illinois
THE HOLDEN CO., LTD.
In Canada—
Montreal, Moncton, Toronto
In Canada—
Winnipeg, Vancouver

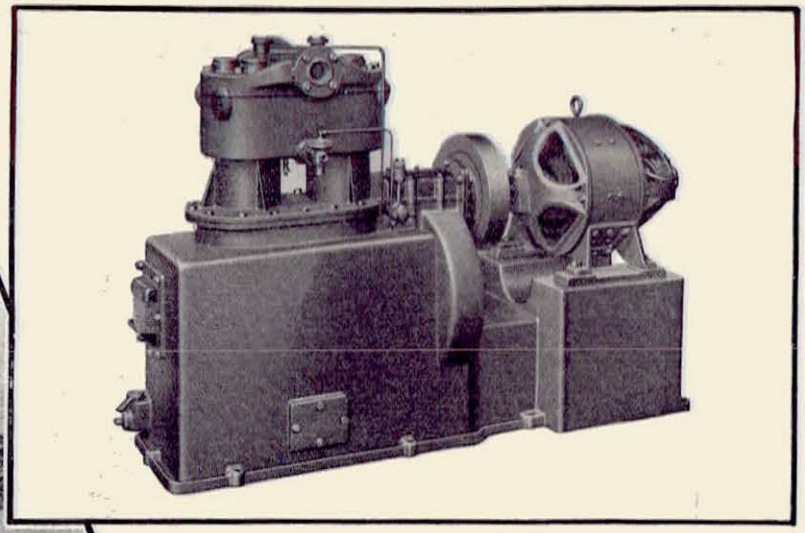
BARCO

Railway Devices



The Hand Pump and its SUCCESSOR





A wide variety of types and sizes comprise the line of Westinghouse air compressors—suitable for train charging and testing, operation of signals, interlock plants, electro-pneumatic car retarders, shop tools—or for any other pneumatic requirement in railroad yards and shops.

MANY "old timers" will recall "away back when" a hand pump was used to provide air pressure for testing brakes in car yards . . . This device was an important piece of equipment in railroad terminals for many years. It has long since passed out of the picture and something more adequate has taken its place . . . Nowadays the brake tester has at his disposal a yard air line supplied by a power driven compressor having a capacity many times that of its little forerunner.

Modern conditions in car yards demand a compressor outfit for charging long trains as well as for making tests on individual cars. Westinghouse motor driven air compressors are being used by many railroads for this purpose. They are efficient, economical, durable—having a reputation for reliable trouble-free service year after year . . . When you need a good air compressor—remember the Westinghouse.

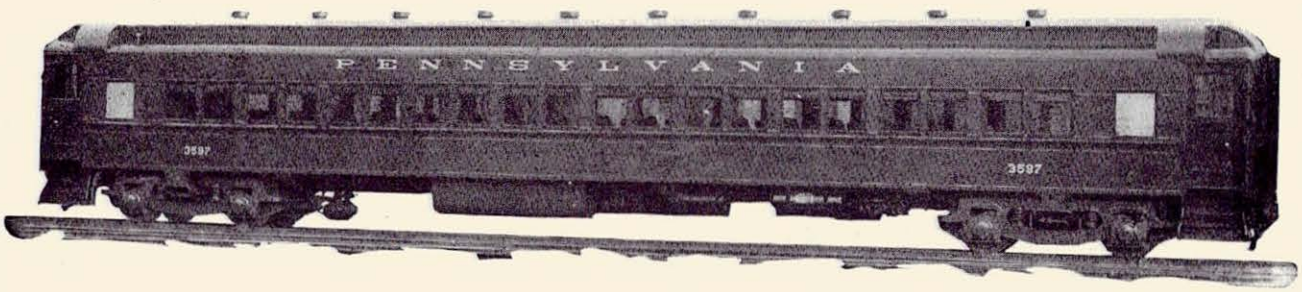
WESTINGHOUSE AIR BRAKE COMPANY

General Office and Works » » » WILMERDING, PA.

FREIGHT AND PASSENGER CARS

KOPPEL AUTOMATIC AIR DUMP CARS

TANK CARS



PRESSED PARTS—FORGINGS—CHILLED TREAD WHEELS
CAST STEEL BOLSTERS AND TRUCK FRAMES

PRESSED STEEL CAR COMPANY

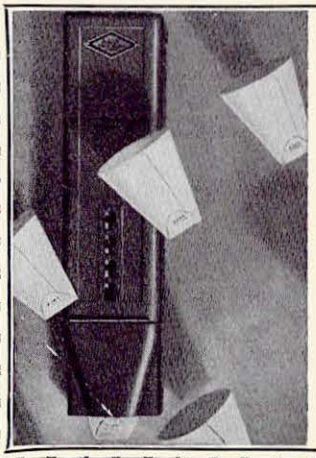
NEW YORK PITTSBURGH CHICAGO ST. LOUIS ST. PAUL

CAMEL & YOUNGSTOWN

Freight Car Door Fixtures

Corrugated Steel Freight Car Doors

CAMEL SALES COMPANY 332 South Michigan Avenue CHICAGO, ILLINOIS



Six Reasons Why Railroad Men Prefer Ajax Cup Equipment

1 — Ajax Cups are delivered open. Passengers like them because they fit the hand; do not drip, spill, collapse.

2 — Ajax Cups cannot be left standing around to spill on upholstery.

3 — Ajax Cabinets are easy to reload.

4 — Ajax Cabinets are sturdy, unbreakable, trouble-proof.

5 — Ajax Equipment is among the most economical on the market.

6 — Ajax Cup equipment was designed especially to meet railroad needs.

Samples and full information will be sent on request

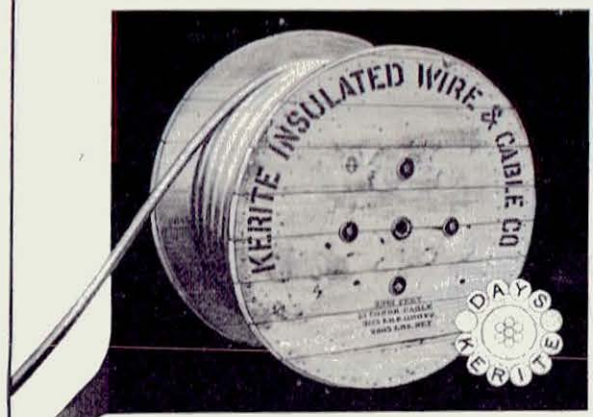
AJAX

Drinking Cups and Cabinets

UNITED STATES ENVELOPE CO.
Springfield, Mass.

EASTERN CUP DIVISION:
Logan Drinking Cup Co. Div., Worcester, Mass.

WESTERN CUP DIVISION:
Pacific Coast Envelope Co. Div., San Francisco, Cal.



THE CAREFUL INVESTOR JUDGES A SECURITY
BY THE HISTORY OF ITS PERFORMANCE
KERITE
IN THREE-QUARTERS OF A CENTURY OF
CONTINUOUS PRODUCTION HAS ESTABLISHED
A RECORD OF PERFORMANCE
THAT IS UNEQUALLED IN THE HISTORY OF
INSULATED WIRES AND CABLES
THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

MAGNUS COMPANY

(INCORPORATED)

Journal Bearings

AND

Bronze Engine Castings

New York Chicago

THE BUCKEYE STEEL CASTINGS CO.
COLUMBUS, OHIO

Truck Frames
Truck Bolsters
Including
Dalman Types
Draft Yokes
"D" Couplers
Major Couplers
Coupler Repair Parts in Stock

NEW YORK CHICAGO ST. PAUL LOUISVILLE

"Arctic" #36 BRONZE
CAR JOURNAL BEARINGS

LONG WEAR

NO TROUBLE

NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.

New York, N. Y.
Jersey City, N. J.
Pittsburgh, Pa.
Meadville, Pa.
Portsmouth, Va.
St. Paul, Minn.

2

BARBER LATERAL-MOTION DEVICE

1,300,000 cars in service on over 60 Railroads and Car Lines

ROLLER SIDE-BEARINGS

Reduces Friction on Rails 15%
Lessens Wheel Flange Wear

STANDARD CAR TRUCK CO.
McCORMICK BUILDING CHICAGO

CAR HEATING

Full 2-inch Steam area

No steam-hose Renewals

Low Maintenance

2-inch End Valves

2-inch Metallic Conduits

2-inch Couplers

VAPOR CAR HEATING CO., Inc.
Railway Exchange Chicago

For location of advertisements in this issue see the Buyers Index, see Advertisers Index

Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
New York Air Brake Co.
Westinghouse Air Brake Co.

Aircraft Corrugated Sheet.
Aluminum Co. of America.

Aircraft Extruded & Rolled Shapes.
Aluminum Co. of America

Aircraft Plates.
Aluminum Co. of America.

Aircraft Screw Machine Products.
Aluminum Co. of America.

Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Device.
Edwards Co., O.

Barges, Steel.
American Bri

Barges, Treated
Century Wo Co. (Division Preserving
National Lu soting Co.

Bars, Concrete
Carnegie Ste
Central Allo
Illinois Steel
Inland Steel
Ryerson &

Bars, Iron and
Armco Railr
Carnegie St
Ewald Iron
Falls Hollo
Illinois Stee
Inland Steel
Lockhart Ir
McConway
Republic St
Ryerson &

Bars, Rolled
Carnegie St

Batteries, Lig
Electric Sto

Batteries, Sta
Electric Ste

Batteries, Stora
Electric Ste
Railroad S
Safety C
Lighting

Batteries, W
Electric St

Beams, Char
Carnegie S
Illinois St
Ryerson
Joseph

Bearings, Axle
S. K. F.
Westinghc Co.

Bearings, B
S. K. F.
Timken R The.

Bearings, C
Brill Co.,
Chicago ment C
Miner, W
Pressed
Symingtc

Bearings,
Fafnir B
Magnus
National Corp.
S. K. F.
Timken The.

Bearings,
Fafnir
S. K. F
Timken The.

Bearings,
America Co.
Fafnir
Hyatt
Miner,
Shafer
S. K.
Standar
Stucki
Timker
Wine Co.

Bearings,
Q. & C
Standar
Stucki

Bearings,
Americ
Chicag ment
Fort Co.
Standa
Stucki
Wine Co.

Beds, Ca
Gener
Cor

New Journal Box Lid requirements per A.R.A. circular No. A-337-1930 are complied with in ASCO A. R. A. Special Torsion Spring Journal Box Lids.

Allegheny

Allegheny Steel Company, General Offices and Works, Brackenridge, Pa. New York, Buffalo, Cleveland, Chicago, Detroit, Milwaukee, St. Louis, Los Angeles

Sheets for Automobile Bodies · Metallic Furniture · Deep Drawn · Allegheny Metal · Aconley · Electrical Sheets · Steel Castings · Better Tubes · Pipe

---

Our tests determine the best type of shoe for each type of service

The American Brake Shoe & Foundry Co.

230 Park Ave., New York — 332 So. Michigan Ave., Chicago

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.

Details of our products appear in the following issues of Railway Age during 1931:

May 16—June 13—July 4—Aug. 1, 8, 15, 22, 29—Sept. 5, 12.

"V" Pilot and Pilot Fibrous Packings . . . . For Every LOCOMOTIVE AND SHOP Service

PILOT PACKING CO., INC.

CHICAGO NEW YORK SAN FRANCISCO

TIE PLATES
Track Appliances
Highway Crossing Signals
Signal Accessories

THE RAILROAD SUPPLY COMPANY
CHICAGO NEW YORK

A QUALITY PRODUCT
RESULT OF 40 YEARS EXPERIENCE

TUCOLITH
FLEXOLITH
CAR FLOORING
TUCO PRODUCTS CORP.
30 CHURCH STREET, NEW YORK
122 S. MICHIGAN AVE., CHICAGO

Western

DUMP CARS
Gives Complete Ballast Protection

WESTERN WHEELED SCRAPER CO.
Builders of Air Dump Cars
AURORA, ILLINOIS

Union Spring & Manufacturing Co.

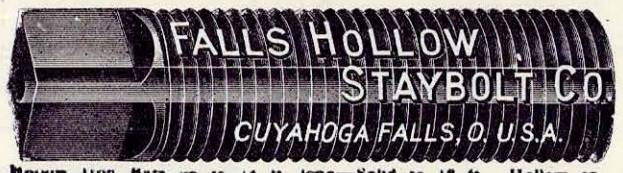
Steel Castings, Coil Springs, Spring Plates, Elliptic Springs, Journal Box Lids
Kensington (All Steel) Journal Box

WORKS: New Kensington, Pa.
PITTSBURGH OFFICE: 2001 Clark Building

Pittsburgh Spring & Steel Co.
1417 Farmers Bank Building, Pittsburgh, Pa.

Makers of Elliptic and Spiral **SPRINGS** of Every Description
of Carbon Vanadium and other alloy steels
Quality and Workmanship Guaranteed
Agencies
Washington, D. C. 824 Union Trust Bldg. — New York 2038 Grand Central Terminal — Chicago 1411 Fisher Bldg.

BUFFALO BRAKE BEAM CO.
—BRAKE BEAMS—
AUXILIARY SUPPORTS FOR BRAKE BEAMS
NEW YORK AND BUFFALO

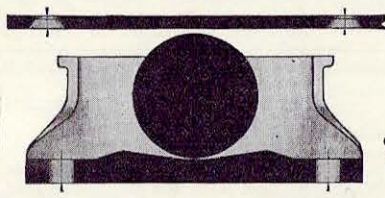


Hollow Iron Bars up to 14 ft. long—Solid to 16 ft. Hollow or solid Stays, plain, headed, or headed and threaded.

THE "FAIR"
RAIL ANTI-CREEPER

THE P & M CO.

CHICAGO NEW YORK
Montreal London Paris Calcutta Sydney



STUCKI SIDE BEARINGS
Manufactured by
A. Stucki Co.
Oliver Bldg., Pittsburgh, Pa.
Canadian Representative:
The Holden Co., Ltd.,
Montreal, Can.

UNARCO

Asbestos and Rubber Packings for Railroad Use. Asbestos Insulating Materials

UNION ASBESTOS & RUBBER CO.
310 South Michigan Ave. — Chicago, Ill.

WINE RAILWAY APPLIANCE CO.
TOLEDO, OHIO

Details of our products appear in following issues of Railway Age during 1931

January 3—February 7—March 7—April 4—May 2—June 6—July 4—August 1—or Railway Mechanical Engineer.

UNION STEEL CASTING COMPANY PITTSBURGH, PA.

Cast Steel Locomotive Cylinders, Carbon and Vanadium Cast Steel Locomotive Frames, Wheel Centers, Crossheads and General Miscellaneous Castings for Locomotive and Car Work.

PROFESS

BATTEY & KIPP
INCORPORATED
Engineers
Complete Railroad Shops and Locomotive Terminals
Power Plants
Industrial Properties
231 So. La Salle St., Chicago

Robert
Inspe
All Rai
22nd Flo
Office

Gulick-Henderson
Company
ENGINEERS
Inspection and Tests
Materials and Equipment
for Railways
General Office
19 West 44th Street, New York
Branches Main Mill Districts U. S.
Dusseldorf, Germany

Second Hand Equipment

POSITION OPEN

IF you are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established twenty-one years. Send only name and address for details. R. W. Bixby, Inc., 102 Downtown Building, Buffalo, New York.

POS
OPPO
wit
or Mac
cal gra
tical ra
partme
broad
market
as sale
busy
ducting
includi
and al
Box 8
Street.

SEN
an
knowl
work
tion.
Burea

TEN years experience calling on eastern railroad, traction and bus mechanical and purchasing departments. Opening New York office and desires two or three additional accounts to round out present line.

G. B. ALLISON
50 Church St.,
New York City

Take advantage
in these colu

Your

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Co.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Co.
Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Co.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Co.
Brill Co., The J. G.
Electro-Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Cars, Power Units.
Brill Co., The J. G.
Electro-Motive Co.

Cars, Quarry.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products Inc
Dearborn Chemical Co.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co
Union Switch & Signal Co

Cleaners, Air.
Dearborn Chemical Co.
Oakite Products Inc.

Cleaners, Air Pump.
Dearborn Chemical Co.
Oakite Products Inc
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Car.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Locomotive.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Metal.
Dearborn Chemical Co.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co. The.

Columns, Water.
Prime Manufacturing Co The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Dearborn Chemical Co.
Oakite Products Inc.

Compounds, Cutting.
Dearborn Chemical Co.
Oakite Products, Inc.

Compounds, Grinding.
Dearborn Chemical Co.

Compounds, Paint Removing
Oakite Products, Inc.

Compounds, Rust Proofing.
Dearborn Chemical Co.
Oakite Products, Inc.

Compressors, Air.
New York Air Brake Co.
Westingnouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

New Journal Box Lid requirements per A.R.A. circular No. A-337-1930 are complied with in ASCO A. R. A. Special Torsion Spring Journal Box Lids.

Allegheny

Allegheny Steel Company, General Offices and Works, Brackenridge, Pa. New York, Milwaukee, Buffalo, Cleveland, St. Louis, Chicago, Los Angeles, Dayton

Sheets for Automobile Bodies · Metallic Furniture · Deep Drawn · Allegheny Metal · Armco · Electrical Sheets · Steel Castings · Seiberling Tubes · Pipe

Pittsburgh Spring & Steel Co.

1417 Farmers Bank Building, Pittsburgh, Pa.

Makers of Elliptic and Spiral SPRINGS of Every Description

of Carbon Vanadium and other alloy steels

Quality and Workmanship Guaranteed

Agencies

Washington, D. C. 824 Union Trust Bldg. — New York 2038 Grand Central Terminal — Chicago 1411 Fisher Bldg.

Our tests determine the best type of shoe for each type of service

The American Brake Shoe & Foundry Co.

230 Park Ave., New York — 332 So. Michigan Ave., Chicago

BUFFALO BRAKE BEAM CO.

—BRAKE BEAMS—

AUXILIARY SUPPORTS FOR BRAKE BEAMS

NEW YORK AND BUFFALO

EDGEWATER STEEL COMPANY

PITTSBURGH, PA.

Details of our products appear in the following issues of Railway Age during 1931:

May 16—June 13—July 4—Aug. 1, 8, 15, 22, 29—Sept. 5, 12.

Hollow Iron Bars up to 14 ft. long—Solid to 16 ft. Hollow or solid Stays, plain, headed, or headed and threaded.

"V" Pilot and Pilot Fibrous Packings . . . . For Every LOCOMOTIVE AND SHOP Service

PILOT PACKING CO., INC.

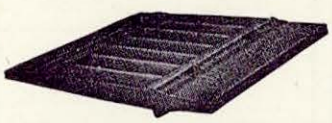
CHICAGO NEW YORK SAN FRANCISCO

THE "FAIR" RAIL ANTI-CREEPER

THE P. & M. CO.

CHICAGO NEW YORK

Montreal London Paris Calcutta Sydney



TIE PLATES

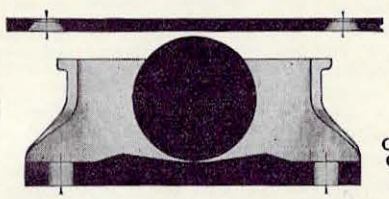
Track Appliances

Highway Crossing Signals

Signal Accessories

THE RAILROAD SUPPLY COMPANY

CHICAGO NEW YORK



STUCKI SIDE BEARINGS

Manufactured by

A. Stucki Co.

Oliver Bldg., Pittsburgh, Pa.

Canadian Representative: The Holden Co., Ltd., Montreal, Can.

A QUALITY PRODUCT

RESULT OF 40 YEARS EXPERIENCE

TUCOLITH FLEXOLITH

CAR FLOORING

TUCO PRODUCTS CORP.

30 CHURCH STREET, NEW YORK

122 S. MICHIGAN AVE., CHICAGO

UNARCO

Asbestos and Rubber Packings for Railroad Use. Asbestos Insulating Materials

UNION ASBESTOS & RUBBER CO.

310 South Michigan Ave. Chicago, Ill.

Western DUMP CARS

Gives Complete Ballast Protection

WESTERN WHEELED SCRAPER CO.

Builders of Air Dump Cars

AURORA, ILLINOIS

WINE RAILWAY APPLIANCE CO.

TOLEDO, OHIO

Details of our products appear in following issues of Railway Age during 1931

January 3—February 7—March 7—April 4—May 2—June 6—July 4—August 1—or Railway Mechanical Engineer.

Union Spring & Manufacturing Co.

Steel Castings, Coil Springs, Spring Plates, Elliptic Springs, Journal Box Lids

Kensington (All Steel) Journal Box

WORKS New Kensington, Pa.

PITTSBURGH OFFICE 2001 Clark Building

UNION STEEL CASTING COMPANY PITTSBURGH, PA.

Cast Steel Locomotive Cylinders, Carbon and Vanadium Cast Steel Locomotive Frames, Wheel Centers, Crossheads and General Miscellaneous Castings for Locomotive and Car Work.

PROFESSIONAL DIRECTORY

BATTEY & KIPP
INCORPORATED
Engineers
Complete Railroad Shops and Locomotive Terminals
Power Plants
Industrial Properties
231 So. La Salle St., Chicago

Robert W. Hunt Company
ENGINEERS
Inspection—Tests—Consultation
All Railway Equipment, Structures and Materials
General Office:
22nd Floor Insurance Exchange
CHICAGO
Offices in all principal cities

JOHN E. MUHLFELD
TRANSPORTATION ENGINEERING
25 Broad Street, New York

Place Your Card Here

Gulick-Henderson Company
ENGINEERS
Inspection and Tests
Materials and Equipment for Railways
General Office
19 West 44th Street, New York
Branches Main Mill Districts U. S.
Dusseldorf, Germany

Use This Space for Your Card

Pittsburgh Testing Laboratory
Pittsburgh, Penna.
Analysis . . Inspection . . Testing . . Research
Branch Offices in the Principal Cities

Second Hand Equipment — Get Together Department — Factory and Railroad Equipment

POSITION OPEN

IF you are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established twenty-one years. Send only name and address for details. R. W. Bixby, Inc., 102 Downtown Building, Buffalo, New York.

POSITION WANTED

OPPORTUNITY DESIRED with Railway Supply Company or Machine Tool Builder. Technical graduate with 12 years of practical railroading in mechanical department of large system, plus broad experience in railway supply marketing methods, desires position as sales engineer or as assistant to busy executive. Capable of conducting tests or handling all details including preparation of catalogs and all other publicity. Address Box 839, Railway Age, 30 Church Street, New York City.

EDUCATIONAL

SEND for Free Special Bulletin and learn how to increase your knowledge of practical railroad work and fit yourself for promotion. The Railway Educational Bureau, Omaha, Neb.

IRON & STEEL PRODUCTS, Inc.
Frank Parker, Pres.
Specializing in
FREIGHT & TANK CARS
RAILWAY EQUIPMENT
CAR PARTS
IRON & STEEL
80 East Jackson Chicago
Send us your inquiries

Place your Classified Advertisement here.

TEN years experience calling on eastern railroad, traction and bus mechanical and purchasing departments. Opening New York office and desires two or three additional accounts to round out present line.
G. B. ALLISON
50 Church St.,
New York City

Your Classified Advertisement should appear here

Take advantage of space in these columns.

Your classified advertisement should appear in this section.

For location of advertisements in this issue of manufacturers listed in the Buyers Index, see Advertisers Index on the last page next to cover

BUYERS INDEX

Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
New York Air Brake Co.
Westinghouse Air Brake Co.

Aircraft Corrugated Sheet.
Aluminum Co. of America.

Aircraft Extruded & Rolled Shapes.
Aluminum Co. of America.

Aircraft Plates.
Aluminum Co. of America.

Aircraft Screw Machine Products.
Aluminum Co. of America.

Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Controller Device.
Edwards Co., O. M.

Barges, Steel.
American Bridge Co.

Barges, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Bars, Concrete, Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bars, Iron and Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
Inland Steel Company.
Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Bars, Rolled Steel.
Carnegie Steel Co.

Batteries, Lighting.
Electric Storage Battery Co.

Batteries, Starting.
Electric Storage Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Railroad Supply Co.
Safety Car Heating & Lighting Co.

Batteries, Wet Cell.
Electric Storage Battery Co.

Beams, Channel & Angle.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Inc., Joseph T.

Bearings, Axle Generator.
S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Symington Co., The.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co. The.

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co
Miner, W. H.
Shafer Bearing Corp.
S. K. F. Industries, Inc.
Standard Car Truck Co.
Stucki Co., A.
Timken Roller Bearing Co.
Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The.
Standard Coupler Co.
Stucki Co., A.

Bearings, Side.
American Steel Foundries
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Standard Car Truck Co.
Stucki Co., A.
Wine Railway Appliance Co.

Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The.

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
Sellers & Co. Inc., Wm.

Billets, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
McConway & Torley Co.
Midvale Co., The.
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The.

Boiler (all types).
Baldwin Locomotive Works, The.

Boiler Checks.
Prime Manufacturing Co., The.

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co
Ohio Steel Foundry Co., The
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

Bolts and Nuts.
Baldwin Locomotive Works, The
Bethlehem Steel Co.
Buffalo Brake Beam Co.
Dardelet Threadlock Corp.
Neely Nut & Bolt Co.
Russell, Burdsall & Ward Bolt and Nut Co.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Bolts, Track.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bonders, Rail.
Q & C Co., The.

Bonding Rail Outfits.
Ingersoll-Rand Co.

Bonds, Rail.
American Steel & Wire Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Bonds, Signal.
American Steel & Wire Co.
Railroad Supply Co.

Bond, Wire Protection.
P & M Co., The.

Boosters, Locomotives.
Franklin Railway Supply Co., Inc.

Boring & Drilling Machines, Horizontal.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel
Sellers & Co., Inc., Wm

Boring & Turning Mills. Horizontal.
Sellers & Co., Inc., Wm

Boring & Turning Mills. Vertical.
Sellers & Co., Inc., Wm

Bottom Rod Supports.
Buffalo Brake Beam Co.

Braces, Rail
Bettendorf Co., The.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q & C Co., The.
Ramapo Ajax Co.
Symington Co., The.

Brake Beam Safety Guards.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beam Supports.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beams.
American Steel Foundries
Bradford Corporation.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Hunt-Spiller Mfg. Corp.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car. Co.

Brake Drums.
American Car & Foundry Motors Co.
Hunt-Spiller Mfg. Corp.

Brake Forgings, Pins, Levers, etc.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Davis Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Schaefer Equipment Co.

Brakes, Hand.
National Brake Co.

Brake Heads.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Pressed Steel Car Co.

Brake Jaws.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Schaefer Equipment Co.

Brake Shoes.
American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Fort Pitt Malleable Iron Co.

Brakes, Air.
General Electric Co.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
National Brake Co.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Brass, Sash.
Edwards Co., O. M.

Brick, Locomotive Arch.
American Arch Co., Inc.

Bridge Builders.
American Bridge Co.
Bethlehem Steel Co.

Bridge & Crossing Planks, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Flooring.
Carey Co., The, Philip.

Bridge Material, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Stringers — (See Stringers, Bridge).

Bronze Powder, Aluminum.
Aluminum Co. of America.

Bucket Handling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Buckets, Grab.
American Bridge Co.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Buffers, Friction.
Edgewater Steel Co.
Miner, W. H.
Standard Coupler Co.
Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The
Johns-Manville Corp.

Buildings, Iron, Steel and Steel Concrete.
American Bridge Co.
United Engineers & Constructors, Inc.

Bulldozers.
Ryerson & Son, Joseph T.

Buses, Motor.
Reo Motor Car Co.

Cable Accessories, Electrical
Graybar Electric Co.

Cables, Electric.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Cableways—(See Tramways).

Caps, Grease.
Prime Mfg. Co., The.

Carbide, Calcium.
Oxweld Railroad Service Co.

Car Insulation.
Carey & Co., Philip, The.
Wood Conversion Co.

Car Lighting Equipment—(See Lighting, Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Co.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Co.
Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Co.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Co.
Brill Co., The J. G.
Electro-Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Cars, Power Units.
Brill Co., The J. G.
Electro-Motive Co.

Cars, Quarry.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.
Dearborn Chemical Co.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Air.
Dearborn Chemical Co.
Oakite Products Inc.

Cleaners, Air Pump.
Dearborn Chemical Co.
Oakite Products Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Car.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Locomotive.
Dearborn Chemical Co.
Oakite Products, Inc.

Cleaners, Metal.
Dearborn Chemical Co.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co. The.

Columns, Water.
Prime Manufacturing Co The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Dearborn Chemical Co.
Oakite Products, Inc.

Compounds, Cutting.
Dearborn Chemical Co.
Oakite Products, Inc.

Compounds, Grinding.
Dearborn Chemical Co.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Dearborn Chemical Co.
Oakite Products, Inc.

Compressors, Air.
New York Air Brake Co.
Westingnouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.

Cylinders, Locomotive
Locomotive Finished Material Co.
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries
Bradford Corporation
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co. The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co
Anaconda Wire & Cable Co
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification. Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners. Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—
(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co
Ryerson & Son, Joseph T

Iron, Engine Bolt.
Lockhart Iron & Steel Co
Ryerson & Son, Joseph T

Iron, Forging Billets.
Lockhart Iron & Steel Co

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co
Ryerson & Son, Joseph T

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co
Ryerson & Son, Joseph T

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co
Lockhart Iron & Steel Co
Reading Iron Co.
Ryerson & Son, Joseph T

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co
Lockhart Iron & Steel Co
Reading Iron Co
Ryerson & Son, Joseph T

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Culvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co

Joints, Steam, Air & Liquid
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co. Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co. Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal
Armco Railroad Sales Co

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T

Lathes, Wheel.
Sellers & Co., Inc., Wm

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The
Sunbeam Electric Mfg. Co

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co
Baldwin Locomotive Works
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works
Porter Co., H. K.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.
Lima Locomotive Works
Porter Co., H. K.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.
Porter Co., H. K.

Locomotives, Geared
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll Rand Co.
Porter Co., H. K.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D.
The.

Locomotives, Rebuilt.
American Locomotive Co.
Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Porter Co., H. K.
Locomotive Stokers.
Standard Stoker Co.
Locomotive Valve Pilot.
Valve Pilot Co
Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.
Lubricators, Piston Rod.
Q & C Co., The.
Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.
Machine Screws, Monel Metal
International Nickel Co., The.
Magnets, Lifting.
Industrial Brownhoist Corp
Electro Metallurgical Sales Corp.
Mechanical Draft Apparatus—(See Heating and Vent. App.).
Mechanical Stokers.
Standard Stoker Co.
Melters, Snow, Electric.
Q & C Co., The.
Metallic Flexible Conduit.
General Electric Supply Corp.
Meters, Water & Oil.
Worthington Pump & Machinery Corp.
Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.
Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.
Milling Machines, Portable Frame Jaw.
Micro Machine Co.
Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Molybdenum Metal.
Vanadium Corp. of America.
Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.
Motors, Electric.
Fairbanks Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co
Motors & Generators.
Fairbanks-Morse & Co.
Moulding.
Aluminum Co. of America
Multiple V Belt Drives.
Worthington Pump & Machinery Corp.
Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.
Nipples, Air Hose.
Prime Manufacturing Co.
Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.
Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.
Nuts—(See Bolts and Nuts).
Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Nuts, Tank Hose.
Prime Manufacturing Co., The.
Office Appliances.
Remington-Rand Business Service.
Oils, Diesel Engine
Vacuum Oil Co.
Oil, Dynamo
Vacuum Oil Co.
Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.
Oils & Greases, Engine
Vacuum Oil Co.
Oils & Greases, Lubricating
Vacuum Oil Co.
Oils & Greases, Motor
Vacuum Oil Co.
Oil, Linseed.
National Lead Co.
Oils, Locomotive Valve
Vacuum Oil Co.
Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.
Oil, Turbine
Vacuum Oil Co.
Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.
Oxygen.
Oxweld Railroad Service Co., The.
Packing.
Westinghouse Air Brake Co.
Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Packing, Asbestos.
Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Westinghouse Air Brake Co.
Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Ring Boiler.
Union Asbestos & Rubber Co.
Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.
Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.
Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paint, Powder.
Aluminum Co. of America.
Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.
Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paper, Carbon.
Remington-Rand Business Service.
Paper, Sheathing.
Carey & Co., Philip, The.
Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.
Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pickling Equipment, Monel Metal.
International Nickel Co., The.
Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company
Piling, Wood.
National Lumber & Creosoting Co.
Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.
Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.
Pins, Air Brake & Clevis.
Champion Rivet Co.
Pins, Center.
Miner, W. H.
Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.
Pipe, Corrugated Iron
Armco Culvert Manufacturers Association
Pipe, Paved Invert
Armco Culvert Manufacturers Association
Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.
Pipe Fittings—(See Fittings, Pipe).
Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.
Pipe, Perforated Iron
Armco Culvert Manufacturers Association
Pipe, Spiral Welded.
Armco Railroad Sales Co
Pipe, Steel Signal.
National Tube Co.
Pipe, Spiral Welded.
Armco Railroad Sales Co.
Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.
Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.
Plates.
Steel Car Forge Co.
Plates, Follower.
Steel Car Forge Co.
Plates, Boiler, Firebox—(See Steel Firebox).
Plates, Center—(See Bearings, Center).
Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.
Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.
Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.
Plates, Tin and Terne.
American Sheet & Tin Plate Co.
Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.
Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.
Plows, Railroad and Grading.
Western Wheeled Scraper Co.
Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.
Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Pneumatic Tools.
Ingersoll Rand Co.
Poles, Creosoted.
National Lumber & Creosoting Co.
Poles, Power Distribution.
National Lumber & Creosoting Co.
Poles, Preservatively Treated.
National Lumber & Creosoting Co.
Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.
Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.
Poles, Telegraph.
National Lumber & Creosoting Co.
Poles, Transmission.
National Lumber & Creosoting Co.
Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Poles, Wood
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Posts, Farm.
National Lumber & Creosoting Co.
Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co
Posts, Highway.
National Lumber & Creosoting Co.
Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.
Posts, Wood.
National Lumber & Creosoting Co.
Powder, Blasting—(See Explosives).
Powdered Coal Equipment.
Muhlfeld, John E.
Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.
Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Preservatives, Wood.
Century Wood Preserving Co
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.
Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.
Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.
Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm
Pulverizers, Coal — (See Crushers, Coal).
Pumping Stations.
Fairbanks-Morse & Co.
Pump Liners, Monel Metal.
International Nickel Co. The.
Pump Rods, Monel Metal.
International Nickel Co. The.
Pump Shafts, Monel Metal.
International Nickel Co., The.
Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.
Poles, Creosoted.
National Lumber & Creosoting Co.
Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Punching and Shearing Machines.
Ryerson & Son, Joseph T
Pushers, Coal.
Standard Stoker Co.
Pyrometers, Superheated Steam.
Superheater Co., The.
Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.
Rail-Bonds.
American Steel & Wire Co
General Electric Co.
General Railway Signal Co
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg Co.
Rail Braces — (See Braces Rail).
Rail Reclamation Equipment
Ryerson & Son, Joseph T
Railroad Shops.
United Engineers & Constructors Inc
Railroad Structures — (See Engineers and Constructors also Building)
Rail Splice Plates — (See Joints, Rail).
Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc. Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.
Railway Signals.
General Electric Supply Corp.
Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.
Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co
Recorders, Speed & Cut-off.
Valve Pilot Co.
Rectifiers for Signal Work
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Reducing Valves.
Vapor Car Heating Co. Inc.
Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co
Refrigerators.
Wine Railway Appliance Co.
Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co
Ryerson & Son, Joseph T
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co
Inland Steel Co.
Ryerson & Son, Joseph T

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Ryerson & Son, Inc. Joseph T.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co
Baldwin Locomotive Works The.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T
Republic Steel Corp.
Standard Steel Works Co

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg Corp

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps, Safety)

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tank Cars.
General American Tank Car Corp., The.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Baldwin Locomotive Works, The.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Taps, Staybolt.
Ryerson & Son, Joseph T.

Tele. & Tele. Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

Testing Machines.
Baldwin-Southwark Corp.

Thermostats.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.

Tie Plates.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Company
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timbers, Pre-framed, Treated
National Lumber & Creosoting Co.

Timber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Wood Conversion Co.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Toilet Papers
U. S. Envelope Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.

Tractors, Industrial.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bro., Geo. P.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo. P.

Transformers.
General Electric Supply Corp.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Trap Doors.
Edwards Co., O. M.

Trap Doors & Fixtures.
Tuco Products Corp.

Traps, Steam.
Johns-Manville Corp.

Treads, Bridge Floor.
Carnegie Steel Co.

Treads, Safety.
Ryerson & Son, Joseph T.

Treatment Water—(See Water Softening and Purifying).

Truck Frames—(See Frames, Truck).

Trucks, Oxy-Acetylene Supply.
Oxweld Railroad Service Co., The.

Trucks, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Company, The.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Flexible Truck Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Standard Car Truck Co.
Symington Co., The.

Trucks, Cast Steel Tender.
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car.
General Steel Castings Corp.

Trucks, Cast Steel, Car and Locomotive.
General Steel Castings Corp.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
Dodge Motor Truck Corp.
General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Globe Steel Tubes Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bro., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo P.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel. Tender.
General Steel Castings Corp.

Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Underground Conduit.
General Electric Supply Corp.

Upholstery, Car.
Brill Co., The J. G.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Valve Caps.
Schrader's Son, Inc., A.

Valve Gears, Locomotive.
Pyle-National Co.

Valves, Air Brake.
Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Check & Angle Steam
Sellers & Co., Inc., Wm.

Valves, Drifting.
Ardco Mfg. Co.
Sellers & Co., Inc., Wm.

Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
Gold Car Heating & Lighting Co.

Valves, Throttle.
American Throttle Co., Inc.
Bradford Corporation.

Valves, Fire.
Schrader's Son, Inc., A.

Varnish Powder.
Aluminum Co. of America.

Varnishes.
General Electric Supply Corp.
Lowe Bros. Co., The
Sherwin-Williams Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Ventilators, Car.
Gold Car Heating & Lighting Co.

Ventilators, Shop & Roundhouse.
Carey Co., Philip, The.
Johns-Manville Corp.

Wardrobes, Rolling and Disappearing Front — (See Lockers).

Washers.
National Malleable & Steel Castings Co.
Ryerson & Son, Joseph T.
Wine Railway Appliance Co.

Washers, Boiler.
Sellers & Co., Inc., Wm.

Waterproofing Materials and Compounds.
Carey Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying
Bird-Archer Co., The.
Dearborn Chemical Co.
Graver Tank & Mfg. Corp.
Permutit Co., The.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
American Steel Foundries.
Gould Coupler Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Symington Co., The.

Welding, Electric.
Electric Railweld Service Corp.

Welding Machines, Acetylene.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg Co.

Welding Machines, Electric.
General Electric Co.
Ryerson & Son, Joseph T.

Welding Machines, Flue.
Ryerson & Son, Joseph T.

Welding Materials.
Oxweld Railroad Service Co.
Franklin Railway Supply Co., Inc.

Welding Process.
Oxweld Railroad Service Co.

Welding Rods.
American Steel & Wire Co.
General Electric Supply Corp.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.

Welding Supplies.
General Electric Co.
Oxweld Railroad Service Co., The.

Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

Well Casings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Wheel Centers, Driving.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Birdsboro Steel Foundry & Machine Co.
Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.
Union Steel Casting Co.

Wheels, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Cast Iron, Chilled Tread.
Assn. of Mfrs. of Chilled Car Wheels.
Graybar Electric Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Standard Steel Works Co.

Wheels, Passenger Car.
Carnegie Steel Co.
Illinois Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Pullman Car & Mfg. Corp.
Standard Steel Works Co.

Wheels, Steel and Steel Tired.
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Wrought Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Standard Steel Works Co.

Whistles.
Ashton Valve Co.

Whistles, Locomotive.
General Electric Co.
Westinghouse Air Brake Co.

Window Fixtures.
Edwards Co., O. M.
Tuco Products Corp.

Wire.
American Steel & Wire Co.
Kerite Insulated Wire & Cable Co.

Wire, Fence.
American Steel & Wire Co.

Wire, Insulated.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Wire, Rail Bond.
American Steel & Wire Co.
Graybar Electric Co.

Wire Rope Clips.
American Steel & Wire Co.

Wire Rope.
American Steel & Wire Co

Wire, Telephone & Telegraph
American Steel & Wire Co
Anaconda Wire & Cable Co.
Graybar Electric Co.

Wire, Welding.
American Steel & Wire Co
Oxweld Railroad Service Co., The.

Wiring Appliances.
Pyle-National Co.

Wood, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Wood Preservative — (See Preservative, Wood).

Wood, Preservative Treatment (Zinc Meta Arsenite).
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Wrecking Cranes — (See Cranes, Wrecking).

Z M A Wood Preservative (Zinc Meta Arsenite).
Curtin-Howe Corp.

Index To Advertisers

A

Allegheny Steel Co. 49
Alliston, G. B. 50
American Arch Co., Inc., The 35
American Brake Shoe & Foundry Co. 49
American Locomotive Co..36, 37
American Steel Foundries.. 11
American Steel & Wire Co. 39
Armco Culvert Manufacturers Association 13

B

Baldwin Locomotive Works, The 2
Barco Manufacturing Co... 45
Battey & Kipp, Inc. 50
Bendix-Westinghouse Air Brake Co. 16
Bethlehem Steel Co. 31
Bettendorf Co., The..... 23
Bixby, Inc., R. W. 50
Buckeye Steel Castings Co. 48
Buffalo Brake Beam Co. .. 49
Buyers' Index .....
....51, 52, 53, 54, 55, 56, 57
Byers Co., A. M..... 29

C

Camel Co. 47
Cardwell-Westinghouse Co.. 25
Carnegie Steel Co. 38
Classified Advertisements .. 50

E

Edgewater Steel Co. 49
Ethyl Gasoline Corporation 17

F

Falls Hollow Staybolt Co... 49
Firebar Corporation 41
Firestone Tire & Rubber Co. 18
Franklin Railway Supply Co., Inc. 34

G

General Motors Truck Co..14, 15
General Railway Signal Co. 3, 60
General Steel Castings Corp. 9
Get Together Department.. 50
Goodrich Co., The. B. F... 20
Goodyear Tire & Rubber Co. 44
Griffin Wheel Co. 4
Gulick-Henderson Co. 50

H

Harbison-Walker Refractories Co. 35
Hunt Co., Robert W. 50
Hunt-Spiller Mfg. Corp. ... 43
Hutchins Car Roofing Co... 32
Hymans-Michaels Co. 50

I

International Harvester Co. 19
International Nickel Co., The 30
Iron & Steel Products, Inc. 50

K

Kerite Insulated Wire & Cable Co., The 48

L

Lima Locomotive Works, Inc. 33

M

Magnus Co. 48
Muhlfeld, John E. 50

N

National Bearing Metals Corp. 48
National Malleable & Steel Castings Co., The 42

P

P & M Co., The 49
Pilot Packing Co. 49
Pittsburgh Spring & Steel Co. 49
Pittsburgh Testing Laboratory 50
Porter Co., H. K. 12
Pressed Steel Car Co. 47
Professional Directory 50

R

Railroad Supply Co., The .. 49
Railway Educational Bureau, The 50
Railway Steel Spring Co. .. 26
Ramapo-Ajax Corporation.. 8
Republic Steel Corp. 49

S

Standard Car Truck Co. .. 48
Standard Steel Works Co... 28
Stucki Co., A. 49
Superheater Co., The 59

T

Teletype Corporation 10
Timken Roller Bearing Co., The .....Front Cover
Trailer Co. of America, The 21
Tuco Products Corp. 49

U

Union Asbestos & Rubber Co. 49
Union Metal Products Co. 27
Union Spring & Mfg. Co. .. 49
Union Steel Casting Co. .. 49
United States Envelope Co. 47
Union Switch & Signal Co. 6, 7, 60

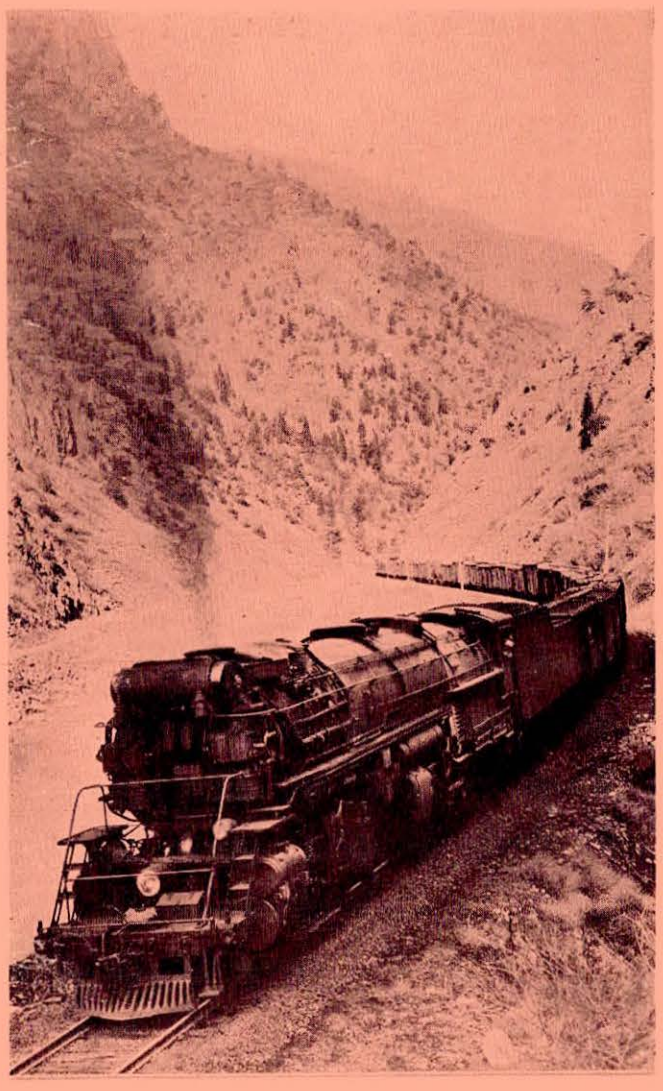
V

Vapor Car Heating Co., Inc. 48

W

Western Wheeled Scraper Co. 49
Westinghouse Air Brake Co. 46
Wine Railway Appliance Co., The 49
Wood Conversion Co. 22
Worthington Pump and Machinery Corp. 24

"Locomotive *First* Costs Are Not *Always* Cheapest"



The truth of this statement is reflected in the policy of maintaining superheater units on a certain western railroad.

The superheater units in engine 814 had seen more than 12 years service and were in need of reconditioning. The Superintendent of Shops knew that he could send them back to the Elesco plant and have them remanufactured but he could not see the need for this. His own men could make very good repairs to other parts of the locomotive at a good saving and he saw no reason why they could not do the same with superheater units. In a very short time, the units were all repaired and engine 814 was on the road again. Result—an *engine failure.*

The trouble was found to have been caused by these shop repairs which were made to save money. Butt-welding had decreased the steam area through the units and the gas area around the units in the flues—the engine *couldn't* steam. So these hasty repairs which were so cheap at first cost were fabulously expensive in the long run.*

This railroad saves money now by sending their unserviceable superheater units to us for complete remanufacturing, after which they are returned with original dimensions retained throughout—new return bends and new ball ends integrally forged with the tubing—new bands and supports—new unit bolts and nuts. They are truly *equal* to new units in efficiency, dependability and long life.

Why not send your units to us and forget the worries caused by cheap and improper unit repairs?

** (Some of these units were sectioned at the restrictions and photographed. May we send you a copy of our bulletin showing these photographs? The bulletin is entitled "Remanufacturing Unserviceable Superheater Units.")*

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

Canada: The Superheater Company, Limited, Montreal

Superheaters — Feed Water Heaters
Superheated Steam Pyrometers — Exhaust Steam Injectors

A-644

Freight Train Costs Reduced!

The forty-seven railways with annual operating revenues above $25,000,000 made a notable improvement in freight train performance in the seven-year period, 1923-1929:

Gross tons per train	increased 21 per cent.
Freight train speed	" 22 " "
Gross ton miles per train hour	" 49 " "
Cost of freight train wages, fuel, supplies and enginehouse expenses per thousand gross ton miles	*decreased* 30 per cent.

". . . There is no surer way to save money on a railroad than to increase train load and thereby cut down the total number of trains operated. In this day of improved service to shippers with an increasing proportion of the freight tonnage moving in time or scheduled freight trains, the problem of increasing train loads becomes particularly severe because of the difficulty that heavy trains find in meeting schedules. In this connection, signals assist markedly because, by reducing delays and cutting down the time spent on passing tracks, they allow heavy trains more time in productive motion and make it that much easier to maintain schedules or avoid overtime. On the other hand, it is similarly possible to load scheduled trains more heavily than might otherwise be possible with their faster schedules. Under the conditions, therefore, it seems perhaps natural that signals should be expected to permit both faster and heavier trains and to further the economies that accompany that sort of operation."*

**Excerpt from "Improvement in Freight Train Performance by 47 Roads," Railway Age, August 15, 1931. Copy on request.*

▼ ▼ ▼

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

78

Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour